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A Proposal for Continuation of

SUPPORT FOR THE APPLICATION OF REMOTELY SENSED DATA

TO STATE AND REGIONAL PROBLEMS

PART I - Technical Proposal

Submitted by

THE MISSISSIPPI REMOTE SENSING CENTER

OFFICE OF RESEARCH AND GRADUATE STUDIES
and
MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION
Mississippi State University
Mississippi State, Mississippi 39762

Submitted to

University Applications Program
Technology Transfer Division
Office of Space and Terrestrial Applications
ETD-6
National Aeronautics and Space Administration
Washington, D. C. 20546

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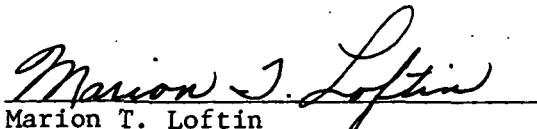
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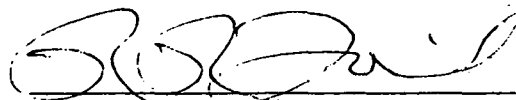
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Marion T. Loftin
Vice-President for Graduate
Studies and Research


R. Rodney Foil, Director
Mississippi Agricultural and
Forestry Experiment Station


W. Frank Miller, Director
The Mississippi Remote Sensing Center

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PROGRAM PROPOSAL ABSTRACT

The application of remotely sensed data and remote sensing technology in Mississippi is being accomplished through a cooperative effort by a multidisciplinary team of faculty members from Mississippi State University, and designated personnel from cooperating agencies in State, local, and federal governments. Cooperation and technical guidance is obtained from the Earth Resources Laboratory at the National Space Technology Laboratories (NASA/ERL).

Specific projects and the cooperating agencies are:

- A. Remote Sensing Applications in Land Use Planning-
Lowndes County. Lowndes County Board of Supervisors;
Golden Triangle Planning and Development District;
Mississippi Research and Development Center.
- B. Applications of Landsat Data to Strip Mine Inventory
and Reclamation Progress. Geological Survey of Alabama.
- C. Landsat-Derived Biological Management Units: White-
Tailed Deer. Mississippi Department of Wildlife Conservation.
- D. Unique Forest Habitats in Potential Lignite Areas of
Mississippi. Mississippi Heritage Program.
- E. Landsat Change Discrimination in Gravel Operations.
- F. Discrimination of Freshwater Wetlands for Inventory
and Monitoring. U. S. Corps of Engineers.
- G. Remote Sensing Data Analysis Support System.

THE MISSISSIPPI REMOTE SENSING CENTER

Current Status

The Center is jointly supported by the Office of Research and Graduate Studies (ORGS), and the Mississippi Agricultural and Forestry Experiment Station (MAFES). MAFES provided funds for the renovation of a structure which presently houses the Remote Sensing Laboratory, and the MAFES Department of Forestry is providing hard money salary support and equipment money for the MRSC Director. The administration of the Center is through the School of Forest Resources to the Director of MAFES and the Vice President of Research and Graduate Studies.

During 1980, discussions between the Director of the Mississippi Remote Sensing Center (MRSC), the Director of the Mississippi Agricultural and Forestry Experiment Station (MAFES), and the Vice President for Research and Graduate Studies; resulted in the recognition of the Center as an active unit of the MAFES/University research and service community. Parallel to this statement has been the recognition by MAFES of its own role as a service organization within the state. Taken together, these actions have clarified MRSC's role in research and development, education, and service. The substantive results of these policy and role statements have been commitment of FY81 funds by MAFES towards the upgrading and maintenance of MRSC's physical plant, support of 20% of the MRSC Director's salary, and the allocation of approximately \$30,000 towards equipment for the Center.

The programs of the Center are supported almost entirely by grants and contracts, which amounted to approximately \$240,000 in FY 1980. Sources of funds have included NASA, Mississippi Minerals Resources Institute, Mississippi Water Resources Institute, Mississippi Department of Wildlife Conservation, Corps of Engineers and various other state and federal agencies.

Faculty are drawn from throughout the University to participate in the program as needed. These individuals participate through partial appointments arranged through their respective academic departments by the Director. The Center is perhaps the most successful ongoing interdisciplinary program on the campus.

Background

The first efforts at Mississippi State University in the application of remote sensing techniques to earth resources took place in 1972 through participation in "Earth Resources Data and Technological Studies Relevant to the Cultural, Physical, and Economic Development of the State of Mississippi" which was conducted for the Earth Resources Laboratory-Mississippi Test Facility of the Johnson Spacecraft Center, National Aeronautics and Space Administration (NASA/JSC) under Contract NAS9-11607. Subsequent to this effort, contracts have been executed and completed with Goddard Space Flight Center of NASA for the study of Earth Resources Technology Satellite data along the Mississippi Gulf Coast (NAS5-21817) and in the South Delta Region (NAS5-21881). A study of the Skylab-EREP Data in the South Delta Area was completed for the NASA/JSC (NAS9-13363).

Because of the interests at the University in the application of remote sensing techniques to environmental problems, there was developed a significant use of image interpretation techniques in the study of the baseline ecology of the Tennessee-Tombigbee Waterway Route. NASA/JSC provided flights at the request of the Corps of Engineers to furnish multi-seasonal images for the purposes of the project. Wildlife population inferences from a study of the vegetative cover characteristics was one of the time-saving survey techniques which was employed. A major data use of ecological significance has been in evaluation of construction activity and placement so as to minimize environmental damage; the locations of thousands of acres of spoil were based on the study results (DACW01-72-C-0048).

Marshall Space Flight Center (MSFC) supported several small projects (NAS8-30623) to develop techniques for inventory of potential recreational sites along the Tennessee-Tombigbee Waterway, and identification and location of archeological sites in the Waterway area. Techniques developed in this project have been recently utilized by the Interagency Archeological Service and the U. S. Corps of Engineers in a contract to locate three extinct town sites along the Waterway. MSFC also provided support for a series of symposia and workshops dealing with applications of remote sensing in east Mississippi (NAS8-31785).

In view of the array of projects involved in this area of study, it was deemed advisable to provide for a more formalized and centralized program identification, and program participant leadership role.

This culminated in the proposal submitted to NASA Office of University Affairs, now the University Applications Program, Technology Transfer Division, Office of Space and Terrestrial Applications, for funds on a long-range, step-funded grant basis to assist in the overall program development which resulted in NASA Grant NGL-25-001-054. By providing a central focal point for interaction between sponsoring agencies and state and local user groups, it was felt that a more effective utilization of remote sensing technology could be made.

Purpose of the Center

The major purpose of the Remote Sensing Center is to interact with units of local, state, and federal government to develop methodology and provide data which will be utilized in a fashion such that a concrete, specific action will be taken by the cooperating agency. The fulfillment of this goal is dependent upon identification of agency problems which are immediate in nature, and subject to at least partial solution through the use of remotely sensed data.

Other subsidiary objectives include the development of a trained staff from the faculty of Mississippi State University who are capable of attacking the varied problems presented by the various State agencies; the training of students in various University academic courses at both the undergraduate and graduate levels; the dissemination of information and knowledge through workshops, seminars, and short courses; and the development of a center of expertise and an operational laboratory for training and assistance to cooperating agencies.

Personnel

In addition to five full-time staff members, participants are drawn from interested faculty researchers throughout the University; selection of personnel is primarily based upon discipline-area needs of the various projects undertaken. Key personnel include: Mr. Frank Miller, Professor of Forestry and Director; Mr. Jonathan Clark, Research Associate and Assistant Director; Mr. John Powers and Mr. John Tingle, Research Associates in Software Development and Forest Soils/Ecology, respectively; Dr. Sid Williams, Associate Professor of Computer Science; and Dr. Jimmy Solomon, Professor and Head of the Department of Mathematics. Other faculty members listed below are either working on projects funded through sources other than NASA or, because of time and budget constraints, serve only as advisors and participate in planning sessions. Professional resumes of the major participants are included in Appendix I.

Mr. E. L. Blake (Landscape Architecture) Drafting, Cartography

Dr. Bradley D. Carter (Computer Science) Computer Systems
and Automated Image Classification Techniques

Dr. Harry A. Jacobson (Wildlife and Fisheries) Wildlife
Habitat Analysis, Wildlife Population Studies

Dr. Carroll Perkins (Wildlife and Fisheries) Habitat Analysis
Techniques

Dr. David E. Pettry (Agronomy) Land Use, Soil Surveys, Land
Capability Analysis

Dr. Roland Reagan (Wildlife and Fisheries) Fisheries Management

Dr. Randy Robinette (Wildlife and Fisheries) Aquatic Ecology,
Limnology

Dr. Charles L. Wax (Geography) Climatological Analyses

Dr. Armando A. De La Cruz (Biological Sciences) Terrestrial Ecology

Facilities and Equipment

The MRSC has approximately 2,500 square feet of office and laboratory space at its disposal. This space is sufficient for a staff of six, open work space, a teaching/research lab, storage of lab and field equipment, and contains an atmosphere-controlled area housing the Center's mini-computer.

The Center's equipment inventory includes a wide variety of photogrammetric instruments, aerial image viewers of various types, a Kelch plotter, drafting equipment, and instruments used for the optical transfer of data from aerial imagery to maps. The Center maintains an inventory of cameras; both 35 mm and 6 in. hand-held types, and an aerial mapping camera. A photographic darkroom laboratory is available for processing imagery. A limited amount of aerial photography has been acquired in-house using aircraft from the University's Department of Aerospace Engineering.

The Center owns a Data General Eclipse S/130 mini-computer which provides for interactive color graphics operations. This system consists of a central processor, removable disc drive, tape drive, paper tape drive, card reader, a thermographic printer/plotter, two keyboard/CRT user terminals, and a color raster image display unit controlled by a Lexidata image processor. A Numonics digitizer hardwired to a Texas Instruments Silent 700 data terminal is used for most communications with the University's UNIVAC 1100/80 mainframe computer. This terminal is fitted with digital tape cassette drives and facilitates the digitizing of information from maps and aerial imagery.

Aside from the programs available through the University's Division of Computer Science, the MRSC maintains an extensive library of computer programs. Algorithms are available for digital image processing, digitizing and rectifying mapped and imaged information, data base construction and updating, data base interrogation, simple and three-dimensional plots of digitized terrain information, and general statistical analyses of digital imagery and data bases.

The Center serves as a repository for aerial imagery, satellite digital data, and a variety of topographic and thematic maps. Coverage is most extensive for the major river flood plains in the state. The inventory of imagery is expanded as projects are conducted.

Field work is an important part of the Center's mission and, as such, equipment necessary to conduct this work in-house is available. Two vehicles and equipment for forest cruising and for soils investigations are included in the Center's inventory.

In addition to the facilities owned by the MRSC, the resources of the School of Forest Resources and most of the University are available through informal agreements with the Center.

THE OFFICE OF RESEARCH AND GRADUATE STUDIES

The Office Research and Graduate Studies is the administrative unit for the coordination of all basic and applied research of the University in the areas of Biological and Physical Sciences, Education, Engineering, Business and Economics, and Social Sciences. It is composed of the following: Architecture Research, Biological and Physical Science Research Institute, Division of Business and Economic Research, Bureau of Educational Research and Evaluation, Electron Microscopy Unit, Engineering and Industrial Research Station, Food Science Institute, Institute for the Humanities, Center for Environmental Studies, Mississippi State University/National Space Technology Laboratory, Radioisotope Center, Remote Sensing, Research and Curriculum Unit, Social Science Research Center, and Water Resources Research Institute.

Interdisciplinary research is promoted and coordinated by the Office of Research and Graduate Studies. The Assistant Vice President for Research serves to help assemble teams of expertise for research opportunities in broad areas. Team activities now include environmental sciences and ecology, and marine research.

Mississippi State University is a participating institute of the Mississippi-Alabama Sea Grant Consortium, a consortium of Mississippi and Alabama universities, and the Gulf Coast Laboratory and the Southeast Consortium for International Development. It

is a member institution of Oak Ridge Associated Universities and Gulf Universities Research Corporation.

With a core of excellent scientists, engineers, and economists, aided by numerous graduate assistants, Mississippi State University has contributed to the economic and industrial growth of the State. Extensive resources are available to assist economic, industrial, and governmental organizations desiring help in discovery, design, and the development of new products. Research, graduate education, and undergraduate education, become the three segments of learning pursued in a university setting. Each of these contributes to the other, making possible a balanced program which provides the State with research oriented graduates as well as new basic knowledge so necessary for growth. The Office of Research and Graduate Studies and the Mississippi Agricultural and Forestry Experiment Station work together and exchange ideas and information in the performance of their missions to do basic and applied research contributing to the total industrial and agricultural development of Mississippi.

THE MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION

MAFES is committed to mission-oriented research and to the idea that significant research achievements will most likely result from an interdisciplinary approach to research problems. While the primary mission of the Experiment Station is agricultural and forestry research for the State, its presence on the campus adds strength to the teaching program. Most department heads and many other staff members are joint teaching and research employees.

They teach or administer instructional programs in agriculture, forestry, engineering, and arts and sciences. The U. S. Department of Agriculture provides some full-time staff members and some who are paid jointly by the Station and the USDA.

Research facilities of the Experiment Station at Mississippi State include laboratories, greenhouses, orchards, crops, pastures, forests, farm machinery, beef and dairy cattle, sheep, hogs, and poultry. Agricultural students at Mississippi State University have the opportunity to observe research in operation. The Station provides graduate assistantships and other part-time employment for students. MAFES employs 242 faculty members of which most are joint appointments with the College of Agriculture and Home Economics (132), School of Forest Resources (26), College of Veterinary Medicine (9), and College of Arts and Sciences (7). Off campus, the Station operates 10 branch stations. Located in the various soil and types-of-farming areas of the State, these branch stations adapt research findings to the areas they serve.

The Experiment Station operates on state and federally appropriated funds supplemented by income from sales of products from the research products. Grants from private industry and from such sources as the National Science Foundation provide additional funds.

YEARLY SUMMARY OF ACCOMPLISHMENTS

As a result of past and current demonstration projects, and the training provided in various educational activities over the years, three significant actions have occurred during the past year. The first has been the development of a "Request for Proposal" (RFP) by the Lower Mississippi Valley Division of the U. S. Corps of Engineers which involves the development of a Landsat and other remotely sensed data-based information system for approximately 1,000 miles of the Mississippi River Floodway. Three division-level Corps personnel attended MRSC workshops and requested a small demonstration project from MRSC prior to the development of the RFP. The responses from potential contractors are due on July 6, 1981. The second significant development was the initiation of a request by the Mississippi State Tax Commission to NASA for an APT project. Personnel from the Center have been working closely with division-level Tax Commission personnel during the past year, and three persons from the Equalization Division attended workshops held by the MRSC. The Tax Commission, as a part of their overall contract with the Mississippi Agricultural and Forestry Experiment Station, has specified that Landsat data will be tested in one county for its applicability to an annual state-wide update of land cover. A third development has been the request by the U. S. Forest Service, Southern Forest Experiment Station to MRSC to submit a project proposal dealing with Landsat classification of forest lands in Puerto Rico to assist in the Forest Survey of that island. If results are acceptable, application in the Southern Region

of the U. S. will be considered.

In other actions or decisions which are based on MRSC data, the Mississippi Natural Heritage Program is routinely evaluating permit applications for surface mining activities with respect to the site locations of "unique forest habitats" selected by MRSC (Project D).

Mr. Ray Gildea, former Director of the Lowndes/Columbus Civil Defense Office, was active in development and use of models in his various activities (Semi-Annual Report #14). Mr. Gildea resigned his position to obtain an advanced degree from Mississippi State University. He was replaced by Mr. Oz Ellis on 18 May, 1981; Mr. Ellis plans to continue using the Lowndes County Information System in his activities (Project A).

In addition to publications and other information and data supplied to various individuals or organizations, approximately 60 individuals toured MRSC facilities. Individuals included the Vice-President of the Federal University of Pelotas, Brazil, five members of the Mississippi Legislature, two members of the Board of Trustees of Mississippi State Institutions of Higher Learning, and Technical Division Directors from two large forest industries. The Directors of both the Southern and Southeastern Forest Experiment Stations of the U. S. Forest Service also visited the facility. Special displays were presented at the Southern Forest Soils Conference in Vicksburg, Mississippi and the NASA Geo-Information System Conference at Biloxi, Mississippi. Mr. Ray Gildea, former Director of the Lowndes/Columbus Civil Defense Office, presented a poster session at the Natural Hazards Research Workshop in Boulder, Colorado.

Project Synopses

As in the past, the primary use of the Lowndes County Information System has been by Civil Defense officials. Over two dozen models, mainly hazard vulnerability, have been created. The system was also employed in real-time resolution of public interest conflicts concerning the suitability of sites within the county for hazardous waste disposal.

The Alabama Strip Mine project has remained inactive, awaiting high quality data.

The Gravel project has also been inactive, awaiting an updated CCT. This tape has been received, and the processing for change detection in gravel operations has been initiated. A final report will be prepared during the next two months.

Three computerized resource data bases are under construction for three wildlife management areas in the state. One data base is complete and the balance will be completed July 1981 (Project C). Each will contain approximately 18 terrain features including Landsat-derived land cover maps. The Mississippi Department of Wildlife Conservation is presently reviewing a habitat quality map generated by the system. In August 1981, more intensive efforts will begin in cooperation with the DWC to field check a broad variety of habitat quality maps from the data bases.

The Unique Forest Habitats project has been completed. Fifty-four stands representing a total area of 3,480 acres in a study area of approximately 4.6 million acres were identified as having at least moderate potential as unique biological communities. Thirty-one

sites were visited by botanists, and 17 were rated high, either on actual occurrence, or potential for containing rare and endangered plant species. These sites have been submitted to the Mississippi Bureau of Geology and Energy Resources by the Mississippi Natural Heritage Program with the recommendation that they be excluded from surface mining activities. A final report is in manuscript form.

The project dealing with the discrimination of freshwater wetland types is moving forward at a satisfactory rate (Project F). Intensive ground truth data have been established for a reservoir and adjacent wetlands, and processing of Landsat digital data has been initiated.

A project dealing with the development of a conceptual design for a Landsat-based, state-wide Resource Information System is proposed for initiation in cooperation with the Mississippi Tax Commission and the Mississippi Central Data Processing Authority. Although the vehicle would be the pressing need for property reappraisal, the State agencies involved are quite receptive to developing an open-ended data base suitable for resource analysis. It is proposed that a demonstration project be accomplished in one county, or a portion of one county.

Software development during the past year has been outstanding with respect to enhancing the capabilities of the overall program. A new destriping algorithm, combined with the generation of pseudo-channels of Landsat data, now gives the Center a crude, but effective, spatial classifier. Software has also been developed to integrate animal telemetry movement data into a geo-information system, a concept which has opened up new dimensions in wildlife habitat research.

SPECIFIC PROJECTS TO BE UNDERTAKEN

PROJECT A

Continuation of

REMOTE SENSING APPLICATIONS IN LAND USE
PLANNING - LOWNDES COUNTY, MISSISSIPPI

INTRODUCTION

The Lowndes County project is a practical demonstration of the merger of remote sensing and data management technology with the traditional planning and decision-making functions. This project is designed to provide cultural, biological and physical data pre-requisite for rational land use decision-making, and other planning functions required in everyday county government operations.

OBJECTIVE

The primary objective of the project was to provide a Landsat-based data management system which would include sufficient data to be of utility to the Civil Defense Director, the Tax Assessor, and the Board of Supervisors of Lowndes County, and for use in a land use planning function by the Mississippi Research and Development Center and the Golden Triangle Planning and Development District.

PROCEDURE

After consultation with cooperating groups, a five acre grid was selected for the county, and a preliminary list of variables required for the anticipated modeling output was developed. Concurrently with the digitizing of the physical, hydrologic, and

cultural variables, Landsat digital data was analyzed using the EOD-LARSYS software package to obtain land cover classes which were merged with the data base. Variables were input by means of a Numonics Graphic Calculator. In cooperation with the user groups, models were developed for Industrial Sites, Wildlife Management Areas, Sanitary Landfill Sites, Residential Development Sites, Institutional Development Sites, High-Risk Crop Flood Areas, and Potential Flash Flood Zones. More recent models are hazard analysis for fire location and occurrence, and real-time models used in predicting hurricane flooding occurrence.

ACCOMPLISHMENTS

The Columbus-Lowndes Civil Defense Council, utilizing the Lowndes County Information System, has continued to develop applications consistent with its program goals. During the past year, over two dozen new models have been generated. The bulk of these are being used to create a comprehensive hazard vulnerability rating system for the county land areas.

Models utilizing Landsat data and other variables include:

1. Transportation hazard models.
2. Fire hazard models.
3. Forest fire hazard models.
4. Air crash hazard models.
5. Flood hazard models.

Some of these hazards have been previously modeled using less exacting criteria. The air crash hazard model has been shared with units at the Columbus Air Force Base, and data for this activity were supplied primarily by the U. S. Air Force and the Federal

Aviation Administration.

Photographs and slides of models developed for Civil Defense have been reproduced and distributed to interested officials in the Federal Emergency Management Agency (FEMA) and the National Weather Service/National Oceanic and Atmospheric Administration (NWS/NOAA). A photographic display including computer output was displayed at the National Hazards Research Workshop in Boulder, Colorado, in July; the City of Columbus and Lowndes County were represented by the Civil Defense Director (Semi-Annual Report #14). The Information System has also been used in several demonstration activities. One very productive demonstration was to a group of businessmen, bankers, and legislators from Lowndes County which contained individuals with opposing viewpoints on selection of sites in the County for hazardous waste disposal. Through negotiation, the group arrived at a suitability model which was run as they input the data. The model indicated the relative suitability not only of areas already under consideration, but also of areas previously unidentified. The exercise clearly pointed out the high value of an information system, not only in decision making, but also in the area of resolving public interest conflicts.

PLANS

The county is being considered for use in demonstrating the data base technologies applicability to store and manipulate tax records. Land ownership data, both map and tabular, will be obtained from sample areas within Lowndes County. The map data (ownership boundaries) will be digitized for select areas and integrated into the existing 48 variable data base. The tabular-type

tax records will be loaded into the computer files and cross-referenced (by coordinates) against the geo-referenced data base.

ULTIMATE USE OF INFORMATION

Because of the variety of past users of the Information System, it is difficult to predict what new applications will be developed. However, the development of a linkage between a geo-referenced data base and a tabular data base is being given high priority in anticipation of state-wide needs for tax reassessment currently underway in the State.

Mr. Ellis, Civil Defense Director, has outlined his needs and direction for developing new applications for the coming year (see attached letter).

COLUMBUS-LOWNDES COUNTY EMERGENCY OPERATING CENTER

19

OFFICE OF THE CIVIL DEFENSE
DIRECTOR



LOWNDES COUNTY COURTHOUSE

COLUMBUS
e Mayor
y Council

Post Office Drawer 1408
Phone 601/328-8120
Columbus, Mississippi
39701
June 25, 1981

LOWNDES COUNTY
Board of Supervisors
The Chancery Clerk

Mr. Frank Miller
Drawer FD
Mississippi State, Mississippi 39762

Dear Frank:

I am writing you concerning our continuing involvement with the Remote Sensing Applications Program at Mississippi State University. As you know the Lowndes County Civil Defense Council has been a primary user of the Lowndes County data base which your office developed. As incoming Civil Defense director, I intend to continue your utilization of this unique resource. Local Civil Defense will continue to function as a clearinghouse for community agencies having problems with potential data base applications.

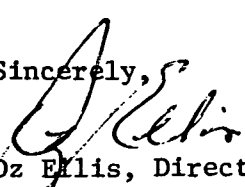
We are presently working with you to perfect an overlay for Lowndes County Data Base hard-copy printouts. The overlay will enable us to pin-point more effectively areas indentified through model parameters.

Among the projects which we would like to undertake this year are:

1. Series of sessions to orient me, and members of my staff, public officials, and planning and development personnel with the modeling process.
2. The opportunity to test and re-examine existing hazard vulnerability models already developed by our office.
3. The development of comprehensive model depicting relative factors pertaining to location of a hazardous waste disposal site in Lowndes County.
4. Updating of several existing variables including the fire incidents variables.
5. The development of new variables including the depiction of the 1973 flood.
6. Explore the possibility of real-time use of the system for crisis relocation planning and response.

We are continuing to see a ground swell of interest in applications of this data base. We certainly hope that we can count on your enthusiastic support during the coming year.

Sincerely,


Oz Ellis, Director

PROJECT B

Continuation of THE APPLICATION OF LANDSAT DATA TO STRIP MINE INVENTORY AND RECLAMATION PROGRESS

INTRODUCTION

The Alabama Surface Mining Reclamation Act of 1975 states, in part, that it is an act "to establish a system of regulation and control of coal surface mining and reclamation"; The Act further establishes the Alabama Surface Mining Reclamation Commission which is empowered to collect reclamation performance bonds which are not returned until it is determined that revegetation of affected lands is successful and conforms to the standards of the Act.

The Mississippi Geological, Economic and Topographic Survey has been designated as the agency responsible for monitoring reclamation of surface mining in Mississippi. Of current concern are areas of limestone, clay, and gravel extraction, though recently lignite mining has begun in the central portion of the state.

OBJECTIVE

The objective of this project is to provide the Geological Surveys of Alabama and Mississippi with the necessary software and interpretive technique for monitoring surface mining occurrence and reclamation activities on a periodic basis. The final product will be capable of classifying various stages of a strip mine plus a measurement of the acreage in the affected land area.

PROCEDURE

A decision tree classifier has been developed and initial results appear to be quite good. Present efforts are directed to testing and validation of the classifier with respect to temporal extension. A recently developed spatial classifier (Semi-Annual Report #15) will be added as another data channel in an attempt to improve classification accuracy. The final product of analysis will be change detection of surface mining activity between the two data sets.

ACCOMPLISHMENTS

This project has been inactive awaiting the archiving of a high quality CCT of later date.

PLANS

When a new CCT has been acquired and processed, the testing and validation will result in one of the following actions being taken:

1. Transferring the software to the appropriate agencies for use in monitoring surface mine reclamation activity;
2. Discontinuing the classifier, as designed, if it does not allow for temporal extension.
3. Redesigning the classifier in light of new information acquired during the testing and validation phase of the project.

ULTIMATE USE OF INFORMATION

The software will be adapted to the Alabama and Mississippi computer systems, and personnel of the Geological Surveys will be trained in processing and interpretation.

The output will provide periodic information on the location, extent, and characteristics of strip mining activity within the coal mining areas. The Geological Survey of Alabama needs such information to advise the Alabama Surface Mine Reclamation Commission on the effectiveness of reclamation efforts.

One of the direct actions which is anticipated is the determination of the amount of the performance bond to be posted. The present acreage of disturbed land is currently determined, in general, by the mining company itself.

PROJECT C

Continuation of

LANDSAT-DERIVED BIOLOGICAL MANAGEMENT UNITS FOR WHITE-TAILED DEER

INTRODUCTION

In order to provide a sound basis for natural resource management in Mississippi, the Mississippi Game and Fish Commission has undertaken the development of a state-wide data base describing various components of the State's ecosystems. The high priority of the white-tailed deer in the Commission's management policies has dictated that various types of deer "habitat" be mapped and evaluated on a state-wide basis. These "habitats" will be delineated on the basis of several variables, one of which is land cover.

Because of its temporal and synoptic characteristics, Landsat multispectral scanner (MSS) data will be used as the basis for discriminating land cover classes. Supervised and unsupervised classifications of seasonal data will be tested to determine the most accurate and cost effective means of mapping land cover.

A computerized data base will be constructed using the CALUP software to facilitate the rapid and accurate evaluation of a number of biophysical variables. These variables will be used as surrogates for white-tailed deer habitats in Mississippi.

OBJECTIVE

The overall objective of this project, therefore, is to develop a cost effective procedure for discriminating and

evaluating the various types of land cover classes which are compatible with the various deer habitat types.

ACCOMPLISHMENTS

Computer-assisted digital image analysis of land cover at the Leaf River study area has been completed. The classified image is presently stored on magnetic tape awaiting injection into the area's digital habitat data base. Image analysis efforts for the Choctaw and Tallahala study areas are 30 percent and 60 percent completed, respectively. All image analysis are being conducted using the EOD-LARSYS program package. Specifically, an unsupervised approach is being employed using the ISOCLS and CLASSIFY processors.

Digital, geo-referenced, habitat data bases have been under construction for each study area. These three data bases have been given high priority during the past year, and numerous terrain features have been digitized from map overlays. The data base for the Tallahala study area is complete, except for Landsat-derived land cover, and contains the following 15 variables:

- Political Boundaries
- Section-Township lines
- Roads - Trails
- Surface Water
- Soils
- Land Cover (from 1974 air photos)
- Proximity to Roads
- Proximity to Streams

Elevation

Ownership

Prescribed Burns - 1976

Prescribed Burns - 1977

Prescribed Burns - 1978

Prescribed Burns - 1979

Prescribed Burns - 1980

Data bases for the Choctaw and Leaf River study areas are 20 percent and 80 percent completed, respectively. Each contains terrain information similar to that for the Tallahala data base.

Computer programs were acquired from the Defense Mapping Agency's St. Louis, Missouri office to analyze digital topographic data. These programs were reviewed, and it was decided that extensive modifications are necessary to use them for generating slope and aspect from NCIC data tapes. Thus, it was decided to write a more simple set of programs in-house. Approximately two weeks of programming effort has been expended in this regard.

Working with Mr. Bob Griffin of the Mississippi Department of Wildlife Conservation (DWC), a model was designed for Wild Turkey habitat evaluation at the Tallahala Wildlife Management Area. This model was used to interrogate the Tallahala habitat data base. The result of this procedure was a map of the study area depicting zones of different (relative) habitat quality. This map, along with tabulations of acreages in each habitat quality group have been forwarded to the DWC for review.

PLANS

The following tasks have been established as goals for the next reporting period:

1. Habitat data bases will be completed for the Choctaw and the Leaf River study areas.
2. Computer-assisted land cover mapping for all three study areas will be completed and loaded in the habitat data bases.
3. The Wild Turkey habitat model which has been forwarded to the Mississippi DWC will, upon receipt, be reviewed and revised if necessary. The DWC will also be solicited for specifications of models for other species across all study areas.
4. A first draft of user-oriented documentation for digital image analysis and digital data bases will be completed.
5. A technology transfer effort will be initiated to involve the Mississippi DWC, the Mississippi Forestry Commission, the U. S. Fish and Wildlife Service, and the U. S. Forest Service in the digital data base technology. We feel we are at the point where we can demonstrate the methods, show examples of user products, and justify the costs of specific projects. A seminar will be planned for summer 1981 to present the techniques.

ULTIMATE USE OF INFORMATION

The initial application of the data base will be in assisting long-range planning and managerial decisions related to deer harvest regulations. The Mississippi Department of Wildlife Conservation has also expressed an interest in applying the information to decisions about other species of wildlife.

PROJECT D

Continuation of

DISCRIMINATION OF UNIQUE FOREST HABITATS
IN POTENTIAL LIGNITE AREAS IN MISSISSIPPIINTRODUCTION

As a result of the critical energy crisis which the United States faces, lignite deposits in Mississippi have become increasingly important as a potential source of recoverable fossil fuels. There is a "belt" of lignite deposits in northern and east-central Mississippi that has a high potential for easy extraction by current surface mining methodologies. The lignite belt is broken into two sections: one section extends from north of Marks, Mississippi, in Quitman County, through western Panola County into Lafayette County; the other belt begins in Lauderdale County and continues through Kemper, Neshoba, Winston, and Choctaw Counties into Webster County.

The surface extraction of lignite will inevitably have an impact on the physical environment where the mining activity occurs. It is imperative, therefore, that areas of unique or historical ecological habitats within the lignite belt be documented and preserved if possible. One type of forest community which needs to be delineated and mapped before it is destroyed by lignite surface mining activities is old growth hardwood stand remnants. Since Mississippi has few remaining older natural stands of hardwood species that have not been affected by clearing for agriculture, by fire, or by harvesting activities, it is essential that these areas be identified as soon as possible.

OBJECTIVE

It is the objective of this proposal to outline a methodology using cost-effective remote sensing techniques for identifying large, contiguous areas of old growth hardwoods that do not exhibit signs of recent disturbance within Mississippi's lignite belt.

PROCEDURE

The proposed study was implemented in two phases. Phase I entailed the identification of large contiguous forested areas in the lignite belt by means of 1:250,000 scale Landsat color composite imagery. Within the identified areas, a computer-assisted classification was made with Landsat digital data to delineate areas which are dominantly of hardwood composition. These areas were superimposed on a digitized base map containing data on physiography, soils, and geology. The superimposed information provided an indication of where areas with a high probability for unique hardwood stand remnants exist. Areas with high potential would include stands occurring on north and east facing slopes of deeply dissected terrain, foreslopes of cuestas and locations with similar physiographic conditions.

Phase II consisted of an aircraft overflight of the areas selected for further study to limit the size of these sites and to establish exact forest community composition. Field survey activities are being conducted to verify the actual location of old growth stand remnants and to confirm ecological habitat contents. The hardwood stands and the existing understory that have been identified will be classified according to the Society of American Foresters

criteria, and modified where necessary to adapt the classification to the nuances of the local forest community. As a final product, the remnant hardwood stands that have been identified as important forest ecological habitats suitable for preservation will be delineated and mapped.

ACCOMPLISHMENTS

Based on Phase II results, a total of 54 stands with at least moderate potential as unique biological communities have been identified. Twenty-nine of the 54 sites have been ground truthed by MRSC personnel. Of the 31 sites checked by the three botanists, 17 were rated as either containing rare and endangered plants at the time of the visit, or as having the ecological characteristics necessary for their occurrence.

The geographic data base for the Natural Heritage Project has been completed. The data base now contains 11 variable classes (Table 1), the final class being ground cover over the study area as determined from digital analysis of Landsat data. The major problem encountered in integrating Landsat data in the data base has been the location of exact control points over the predominantly rural zones in the study area. This problem has been successfully resolved, however, and the maximum root mean square error over the entire data base now averages well below 2 for the fifty acre cells. All other data bases created at the Center are, without exception, maintained at a RMS error of less than or equal to 1 for their respective cell sizes. All data base creation and maintenance software has been fully optimized, and is running smoothly.

TABLE 1. UNIQUE FOREST HABITAT DATA BASE - FIFTY ACRE CELL SIZE

1	Topography
0	No Rough Topography
1	Rough Topography
2	Soil Orders
0	Void
1	Alfisols (Wet)
2	Alfisols (Moist)
3	Entisols (Wet)
4	Entisols (Moist)
5	Inceptisols (Wet)
6	Ultisols (Moist)
3	Soil Associations
0	Water or Void
1	Nearly Level, MWD and SPD, Silty: Alluvium, Delta and Loess
2	Alluvial, Flood Plains, SPD and PD, Silty and Clayey
3	Deep Loess
4	Sandy Clay Hills
5	Thin Loess and Coastal Plains
6	Alluvial Terrace With Pan
7	Thin Loess
8	Slackwater Flats
9	Silty Terrace
10	Delta-Medium Texture Wet
4	Hardwood Forests - Landsat Imagery
0	Void
1	Forests
5	Cultural
0	Void
1	Roads
2	Cities
3	Railroads
4	Airports
6	Hardwood Forests - County Foresters
0	Void
1	Hardwoods
2	Pine
3	Mixed
4	Other - Not Identified
5	Contradictory
6	Unknown

TABLE 1 - Continued

7	Water
0	Void
1	Lakes
2	Rivers
3	Major Streams
8	Hardwood Sites (Low Altitude Color I.R.)
0	Void
1	Hardwood Site
9	Counties (North Part of DB)
0	Void
1	Tunica
2	DeSoto
3	Tate
4	Quitman
5	Panola
6	Lafayette
7	Tallahatchie
8	Yalobusha
9	Calhoun
10	Grenada
11	Chickasaw
10	Counties (South Part of DB)
0	Void
1	Montgomery
2	Webster
3	Clay
4	Choctaw
5	Oktibbeha
6	Winston
7	Noxubee
8	Kemper
9	Lauderdale
11	Land cover From Landsat Imagery
0	Void
1	Undefined
2	Hardwood Predominates
3	Inert. Highly Reflective
4	Water

PLANS

A final report is in manuscript form and the final draft will be completed during the summer of 1981. The data base will be maintained for another year before being transferred to the Heritage Program.

ULTIMATE USE OF DATA

The use of the data is described in an excerpt from a letter from Dr. Jacob, Program Coordinator and Curator of the Heritage Program:

"As you know, our primary purpose for contracting with you to identify relatively undisturbed cover types is to take the information you provide us with and then recommend to the Mississippi Bureau of Geology and Energy Resources areas that they should designate as being unsuitable for surface mining of lignite coal. Our secondary purpose is to identify areas that should be acquired as state natural areas or natural area preserves. The information you provide is given to a team of three botanists, each of which have their area of responsibility. They visit these sites to look for rare and/or endangered species. The relatively undisturbed nature of these areas make them good candidates as being significant. The botanists collect representative species from each of the sites and send them to the Museum where they will be permanently housed as voucher specimens. With this information, we will be able to assess the impacts of mining and/or study ecological succession."

PROJECT E

Continuation of

LANDSAT CHANGE DISCRIMINATION IN GRAVEL OPERATIONS

INTRODUCTION

In order to verify the areas of gravel operations which are subject to reclamation under the State's Surface Mining Act; i.e., lands mined after April 15, 1978, a historical data source which both predates and postdates the April date will be necessary. In addition to the temporal nature of the data, the data source should also provide for complete coverage of the major areas of activity. As identified by the Mississippi Bureau of Geology and Energy Resources (MBGER) the major activity areas are the Tombigbee River from Tishomingo to Noxubee County, the Loessial Bluffs, and the Copiah County area.

The only data source which provides temporal, synoptic coverage of the nature required for this project is the Landsat data collection system. It is proposed that Landsat digital data be utilized to effect a change detection of areas of active gravel operations between a date just prior to April 15, 1978, and a date during the spring or summer of 1979.

OBJECTIVES

The objectives of this project are to: (1) develop methodology and computer software to effect temporal change detection in extent of gravel operations, and (2) perform the change detection analysis on a portion of the Loessial Bluffs from a point east of Greenwood to the north.

PROCEDURE

Initially it was planned to acquire two CCTs, one from a date just prior to April 15, 1978, and the second, one year later. A CCT was acquired for a late March, 1978 date. Locations of individual operations in the study area were acquired from the MBGER, and served as screening to reduce the amount of computer time required. Individual activity areas were extracted from the available CCT and stored. Initially, only those areas were used for development of a software package for change detection. The accuracy of a normal EOD-LARSYS ISOCLS analysis was tested and compared with a tree-classifier algorithm which was developed.

The product generated was a computer map of each activity site condition just prior to April 15, 1978; the active acreage is shown for each site. The study area is that portion of the Loessial Bluffs occurring on the CCT of Path 24, Row 36 from slightly north of Greenwood and extending to a line west from Oxford, Mississippi.

ACCOMPLISHMENTS

The development of conceptual software necessary for the project has been achieved. A complete digital image classification analysis has been performed for the study area from satellite data exposed on March 22, 1978, a date just prior to the enactment of the Mississippi Reclamation Act.

Due to line start anomalies and hardware malfunctions of Landsat 2 and 3, it was not possible to obtain satellite data of a sufficient quality for the spring season of 1979 as originally planned.

Currently, data are available that meet the following specifications:

Exposure Date: 02JAN81

Image Quality (Bands 4, 5, 6 and 7): 8888

Cloud Cover: 00%

A band sequential CCT has been obtained for this exposure and a complete digital analysis will be performed that will serve as the actual change detection analysis.

PLANS

The change detection procedure will be accomplished in July, 1981, and a final report will be prepared by August.

ULTIMATE USE OF INFORMATION

The data will be utilized to check the number of acres reported by gravel operators as requiring reclamation on the data Surface Mining Reclamation Regulations took effect.

PROJECT F

Continuation of

DISCRIMINATION OF FRESHWATER WETLANDS FOR INVENTORY AND MONITORING

INTRODUCTION

Concern over the destruction of the nation's wetland resources is currently in the forefront of environmental issues. Their value as a protection to other ecosystems has only recently been recognized, as well as their concomitant value in supporting unique plant and animal species, although many studies have been conducted, laws passed, and classifications systems established, there are still many large gaps in knowledge which need to be filled.

The official wetlands classification system currently being used by U. S. Government agencies is the U. S. Fish and Wildlife Service's Classification of Wetlands and Deepwater Habitats of the United States. This system was designed for use on a nationwide basis, and is therefore necessarily very general in character; hence, it is of limited value on an area or local scale. The Mobile Corps of Engineer District has expressed a need for, and interest in developing a system that would be more closely correlated to unique local and area conditions.

OBJECTIVES

The objective of this proposed study is to develop remote sensing techniques, utilizing aerial imagery and satellite data, for delineating freshwater wetland types with increased accuracy and decreased intensity of on-site inspection.

PROCEDURE

Okatibbee Reservoir, located in Jasper County, Mississippi, will be used as the model or primary study area, since it is a hardwood bottomland wetland ecosystem typical of the southeastern United States. Due to the presence of the reservoir itself, a number of other wetland ecosystems and subsystems have developed adjacent to the area. In addition, aerial imagery and Landsat data are already on hand.

Training sites will be selected on Okatibbee Reservoir that are representative of classifications under the Fish and Wildlife system. These training sites will then be ISOCAS'ed and the study area classified utilizing multi-temporal Landsat data and the EOD/LARSYS software package. Aerial imagery and field data will provide ground truth for refining the computer classification, i.e., assigning signatures to specific wetland types.

The refined system will then be tested for accuracy and functionality in several different locations using an unsupervised classification method, and the ground truthing by on-site inspection.

ACCOMPLISHMENTS

The Okatibbee Reservoir area within the Corps of Engineer boundary (10,950 acres) has been ground truthed, manually analyzed and mapped on 1/24,000 color infrared imagery, and transferred by sketchmaster for geo-correction to U.S.G.S. 7.5 minute quad sheets. The mapping has been ground checked, and permanent mylar master copies have been made. Thirty-seven (37) land cover categories were delineated, and acreages for each category determined by polar planimeter.

The same general process has been completed for the supplementary

study area on Tallahala Creek; however, little ground truth data were collected due to adverse land-owner reaction. This problem may result in the deletion of the Tallahala area from the study, even though several training sites have already been selected from a Landsat gray-scale computer map. There is, however, one large beaver impoundment which remains a possibility as it is located on property owned by an oil company from whom access permission has been obtained.

An ISOCLS and unsupervised classification of the entire Okatibbee Lake area utilizing May 1978 Landsat CCT digital data and the EOD/LARSYS software package was run prior to completion of imagery analysis to develop general land cover signatures.

Seven (7) major delineations were made:

- 1) Inert
- 2) Edge
- 3) Hardwood
- 4) Field
- 5) Pine
- 6) Open Water
- 7) Marsh

In addition, four subclasses were delineated for marsh areas.

PLANS

Within the next three months, specific wetlands training sites will be selected at Okatibbee Lake, ISOCLSeD, and intensively field checked in order to identify the four marsh subclasses and determine whether they are truly unique. Also, a decision will be made whether to

utilize the oil company site on Tallahala Creek as a training site;
additional test sites will be selected to test the classification system.

ULTIMATE USE OF INFORMATION

The Corps of Engineers requires a survey tool for checking on
areas which require more intensive examination for EPA 404b permitting
activities.

PROJECT G

Request for Initiation of

A CONCEPTUAL DESIGN FOR A LANDSAT-BASED, STATE-WIDE INFORMATION SYSTEM

INTRODUCTION

The Supreme Court of Mississippi has directed that the Mississippi Tax Commission (MTC) shall, beginning with the 1983 tax rolls, base all appraisals on a uniform basis throughout the state, and provide for an annual update of land use throughout the state. This decree, later enacted as various sections of the Mississippi Code, has raised formidable problems in the areas of data handling and annual assessment of property.

Personnel of the Mississippi Remote Sensing Center (MRSC) have been concerned with these problems for some time, and have worked closely with MTC Equalization Division personnel to develop concepts for data management and land cover analysis. Concurrently with these efforts, it was determined that the State has been moving ahead with plans for a state-wide telecommunications network under the provision of HB 1062, which provides for on-line processing of vehicle registrations. Preliminary discussions between the Central Data Processing Authority (CDPA), the state agency responsible for the technical aspects of the system, MTC, and MRSC personnel have indicated the possibility of developing the system into a resource information system which includes the data necessary for taxation purposes.

OBJECTIVE

The objective of this project is to determine the feasibility of using Landsat digital data as a means of acquiring annual changes in land cover on a state-wide basis, and integrating the land cover change into a data management system which will be accepted by the proposed state-wide telecommunications system.

PROCEDURE

One county, or portions of one, will be selected for demonstration. Software capable of integrating both a geo-information phase and a record-keeping (tabular) phase of a data base will be developed. The system should be developed to be operational to the fullest extent possible in the county offices. The telecommunications system now under consideration in the state is basically a classic distributive processing scheme; i.e., CDPA host computers (IBM) interfaced to minicomputers in each of the nine tax district offices which in turn are interfaced with, at a minimum, a CRT and printer in each county office.

Concurrently with software development, Landsat data will be processed utilizing both conventional classification models, and conventional means plus a spatial classifier. A data base will be constructed with township, range, and section lines, parcel boundaries, land cover, soil data and transport network as variable inputs. The actual use value of each parcel determined by this procedure will be compared with the parcel use values obtained from the county assessor's office.

PLANS

MRSC personnel will meet again with CDPA and MTC personnel in mid-July to initiate formal planning for this project.

ULTIMATE USE OF DATA

If the demonstration is successful, the MTC has agreed to press for adoption of the technique in an operational mode. A letter from Mr. Loyd D. Huckaby, Chief of the MTC Equalization Division, is attached.

STATE TAX COMMISSION



A. C. LAMBERT, SR., CHAIRMAN
AND COMMISSIONER OF REVENUE

H. LATRELLE ASHLEY
ASSOCIATE COMMISSIONER

ROBERT A. BAGGETT
ASSOCIATE COMMISSIONER

POST OFFICE BOX 980
JACKSON, MISSISSIPPI 39205

TO: National Aeronautics and Space Administration
FROM: Loyd D. Huckaby, Chief, Equalization Division
DATE: June 8, 1981
SUBJECT: Implementation of Proposal

The State Tax Commission will furnish personnel time to the project as is needed, and, if the project is successful as measured by the criteria listed below, the State Tax Commission will facilitate the implementation as a standard procedure in the state-wide property appraisal using the Landsat information.

The system must be:

- a. Cost effective both for the Tax Commission and the local county appraisers;
- b. Implementation must be within the fiscal and personnel capability constraints of the State Tax Commission and assessors;
- c. Be capable of accurately discriminating land cover types, even on small parcels (5 to 10 acres);
- d. The data base must have a geoinformation component inter-actively tied to a records system;
- e. The data must be flexible with respect to the input of additional levels of information, and update of all variables, i.e., new soils data, land cover, ownership records, and parcel boundary changes;
- f. The update and a modeling capability must be, to a large extent, residual in the individual assessors' offices.

National Aeronautics and Space Administration
Page 2
June 8, 1981

It is realized that as the project progresses, we shall probably have to re-assess our evaluation criteria, but what I have described is what we consider to be an ideal system at this point. With respect to Point C, I realize that in the foreseeable future the processing of Landsat digital data will be beyond the capabilities of the State Tax Commission, and we are prepared to contract with the Mississippi Remote Sensing Center at Mississippi State University for an land cover update, should the project be successful.

mIn

PROJECT H

Continuation of REMOTE SENSING DATA ANALYSIS SUPPORT SYSTEMS

INTRODUCTION

In order to effectively implement the remote sensing applications and projects outlined in this proposal, particularly those utilizing the Landsat multispectral data, it is essential that reasonably sophisticated computer-based data processing and data analysis systems be developed. Considerable effort is required to develop new computer software, to adapt existing software, and to install needed hardware facilities. This is in addition to the operational data processing and data analysis needs of each demonstration project.

OBJECTIVE

It is the specific objective of this effort to provide the data collection and processing capabilities necessary to support the various demonstration projects and to provide a low-cost operational center so that such projects can have a continuing input into the overall objective of the Remote Sensing Center, both for present and future use.

PROCEDURE

Much work done at the Center involves classification and utilization of Landsat imagery in forest and ecosystem-oriented research, generally (though not always) in conjunction with the Center's geographic information system (G.I.S.) Capability. New software developed addresses the problem of enhancing classifier performance and accuracy.

To this end, programs now exist which will effectively destripe Landsat imagery (including geo-referenced imagery), and generate pseudochannels of data which have been quantitatively demonstrated to enhance maximum likelihood classifier sensitivity as well as accuracy. The results of this study appeared as a master's thesis in Computer Science by a staff member (Semi-Annual Report #15).

Software developed at the Center now permits integration of classified Landsat imagery into a G.I.S. on a routine basis. The software also performs a "transect" resampling procedure, at the option of the user, for instances when a scale conversion of the data is also required.

Software has been developed in cooperation with the Department of Wildlife Management at the University, which permits the tracking by radio of animal locations within a G.I.S. This has opened up an entirely new dimension to wildlife research, since the capability now exists to monitor an animal's movements through time within a logically structured ecosystem rather than simply across the surface of a map.

A software system is now being designed and coded which will directly link a G.I.S. to a county's files on land ownership. In this manner, management information based on ecological monitoring utilizing the G.I.S. can be directed immediately to interactions involving the individual landowners affected. Such a system, when completed, will be a very powerful and positive tool for agricultural extension services and the concentration of resources where they can be applied with the greatest impact. The formal linkage of the legal land ownership system recently proposed by the Mississippi Legislature to an accurate ecological information base is an exciting prospect.

ACCOMPLISHMENTS

Presently, three programs exist on the Data General S130 computer for the purpose of manipulating images on the Lexidata 6400 image display system. The three programs are DEMON, CALUP, and IDBM. A brief description of each program follows.

DEMON works from a data base file to display various images on the image display system. A data base consists of up to 40 scenes (called variables) each describing a different attribute of a common geographical area. The primary utility of DEMON has been to display the various data base variables and to overlay linear feature variables onto terrain feature variables.

The CALUP (Computer-Aided Land Use Planning) program works from the same data base file as does DEMON. The user inputs a model consisting of the data base variables to be used and weights to be associated with each value of each variable. The different variables described by the model are then combined in a linear fashion, one sixth at a time, to form a new scene or image. The new scene is immediately loaded in the Lexidata 6400 refresh memory for viewing on the color monitor. Both the model and the resulting image can be saved for further viewing and manipulation.

The IDBM program has been used primarily for drawing and manipulating images from MSS tapes and images produced by the LARSYS classifier routine. The program allows the user to input an expression containing both arithmetic and logical operations. Operanda in the expressions use previously saved images. The program then combines said images one pixel at a time in the manner described by the input

expressions to produce a new image. The new image is then displayed on the color monitor.

PLANS

Outside of the fact that DEMON and CALUP use a common data base, the only connection among the three programs lies in both program ability to save and restore images in a common format. This makes it awkward (and sometimes frustrating) for the user who needs to use more than one of the programs to obtain a desired image. In order to remedy this situation an effort is currently underway to combine the features of CALUP, DEMON, and IDBM into one program.

The new Image Operating System program will be modeled somewhat after the NASA/ELAS program. That is, the program will be very modular in structure. It will consist of a root segment and a single overlay area. The function of the root segment will be to input commands, load the necessary module into the overlay area, and pass control to the module to carry out the command. Utility routines will be provided to add modules and to delete modules from the program. It is expected that the effort will require approximately three months to complete the software development.

A situation which has existed for some time at the Center is the "Division of Labor" between two different computer systems; a UNIVAC 1100/80 Mainframe, and a Data-General S-130 Minicomputer (DG). The recent acquisition of the DG has made this redundancy no longer a viable approach since system costs to this system have increased. It is therefore considered absolutely necessary that all existing capabilities and services be transferred as quickly as possible to the

minicomputer system. The existing mainframe capability will be archived on tape as a backup for times when the DG is being serviced.

It is the goal of the Center to tailor the DG into a sophisticated tool for research as well as service in the areas of forestry, land management, ecological science, and image processing. The system design strategy will be to make interactive use fault tolerant and self-explanatory in order to encourage use of the system by professionals in the field of bio-science who have limited computer background. In order to make the system more accessible to such users, plans are underway to relocate the system in the Department of Forestry on the campus of Mississippi State University. It is felt that widening the professional user base of the system will insure a progressive evolution of system capability as well as future support participation by user departments.

A Proposal for Continuation of
SUPPORT FOR THE APPLICATION OF REMOTELY SENSED DATA
TO STATE AND REGIONAL PROBLEMS

PART II - Management Proposal

Submitted by

THE MISSISSIPPI REMOTE SENSING CENTER
OFFICE OF RESEARCH AND GRADUATE STUDIES
and
MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION
Mississippi State University
Mississippi State, Mississippi 39762

Submitted to

University Applications Program
Technology Transfer Division
Office of Space and Terrestrial Applications
ETD-6
National Aeronautics and Space Administration

June 1981

A Proposal for Continuation of
SUPPORT FOR THE APPLICATION OF REMOTELY SENSED DATA
TO STATE AND REGIONAL PROBLEMS

ADMINISTRATION

The Mississippi Remote Sensing Center (MRSC) is administered by the Office of Research and Graduate Studies and the Mississippi Agricultural and Forestry Experiment Station (MAFES) through the Department of Forestry. The Center was established at Mississippi State University for the purpose of administration of remote sensing research grants and contracts of an interdisciplinary nature with environmental relevance. Nine years of experience in the direction of interdisciplinary programs by the Center serves to provide adequate day-to-day direction and detailed administration of the proposed program. The Center is directed by Professor W. Frank Miller, who reports through the Department of Forestry to the Vice President for Graduate Studies and Research, Dr. Marion T. Loftin, and the Director of MAFES, Dr. R. Rodney Foil.

Professor W. Frank Miller has had extensive experience in the management of interdisciplinary programs. Professor Miller, in addition to serving as the Director, has been Principal Investigator of a number of completed projects, and he is currently directing the Lowndes County, Lignite, Gravel and Wetlands Inventory projects in collaboration with the various State and Federal agencies. He has had experience as Principal Investigator in a study of the Ecology

of the Tennessee-Tombigbee Waterway for the Army Corps of Engineers, Mobile District, utilizing NASA/JSC aircraft imagery for analysis. More recently he has served as Principal Investigator in a study of the feasibility of relocating extinct towns through the use of aerial imagery, and a study of pre- and post-construction wetland impacts in two river systems.

Dr. J. L. Solomon is directing the Strip Mining project, and has assumed responsibility for evaluation of different computer-generated classification or pattern recognition routines, and the development and refinement of a tree classifier package.

Dr. Sid Williams and Mr. John Powers will continue to serve in the area of software development and computer analysis, with particular emphasis on the minicomputer interactive graphics system.

Jon Clark, Research Associate and Assistant Director, is responsible for operation of the Remote Sensing Laboratory and serves as a liaison with user groups.

Dr. David E. Pettry serves as a consultant on Land Use Studies and Agriculture and in the development of new projects. Mr. John Tingle is responsible for day-to-day operations in this area. Dr. Charles L. Wax is serving as a consultant on Climatology and Hydrology, and Dr. Harry Jacobson serves as the consultant in wildlife areas. Mr. Clark also has responsibility for the wildlife area.

The research team consists of professionals and graduate students from forestry, agronomy-soils, geology and geography, wildlife and fisheries, computer science, and mathematics.

Liaison with other State agencies such as the Mississippi Research

and Development Center, the appropriate planning and development district directors, the Mississippi Game and Fish Commission, the Mississippi Highway Department, the Geological Surveys of Mississippi and Alabama, and the Tennessee-Tombigbee Waterway Authority will be continued. Communication with these agencies and further involvement with other agencies will be sought as the program continues.

EARTH RESOURCES LABORATORY - NASA/ERL

Through the cooperation of Mr. Wayne Mooneyhan, ERL Director, simulated TM data have been received in order to test the efficiency of the spatial classifier developed by Mr. John Powers. Other support has included access to the system for three days of training on the ELAS software for Mr. Powers and Dr. Williams. A closer relationship with ERL was established through activities resulting from the funding of NAS13-158, Remote Sensing Short Courses for State, Local and Federal Agencies. Mr. Bob Barlow has served as liaison for training activities, and Mr. Buddy Atwell was the Contract Officer for NAS13-93.

TECHNICAL PERSONNEL

Resumes of the proposed participants in this program are presented as Appendix I of this proposal. In brief, these are:

Professor W. Frank Miller	Director, MRSC, and Professor of Forestry Photogrammetric Techniques, Remote Sensing Applications, Forest Ecology
Mr. Jonathan Clark	Research Associate and Assistant Director, MRSC
Dr. Sidney G. Williams	Assistant Professor of Computer Science, Software Development
Mr. John Powers	Research Associate, Software Development
Mr. John Tingle	Research Associate, Forest Soils and Ecology
Dr. J. L. Solomon	Professor and Head, Mathematics Department, Computer-Assisted Pattern, Recognition/Classification
Dr. D. E. Pettry	Professor and Agronomist Soil Survey Leader
Dr. Charles Wax	Assistant Professor of Geography Climatological Data
Dr. Bradley D. Carter	Professor and Head, Computer Science Department
Dr. Harry Jacobson	Associate Professor of Wildlife Management, Wildlife Data Bases
Mr. Phil Turnipseed	Research Assistant

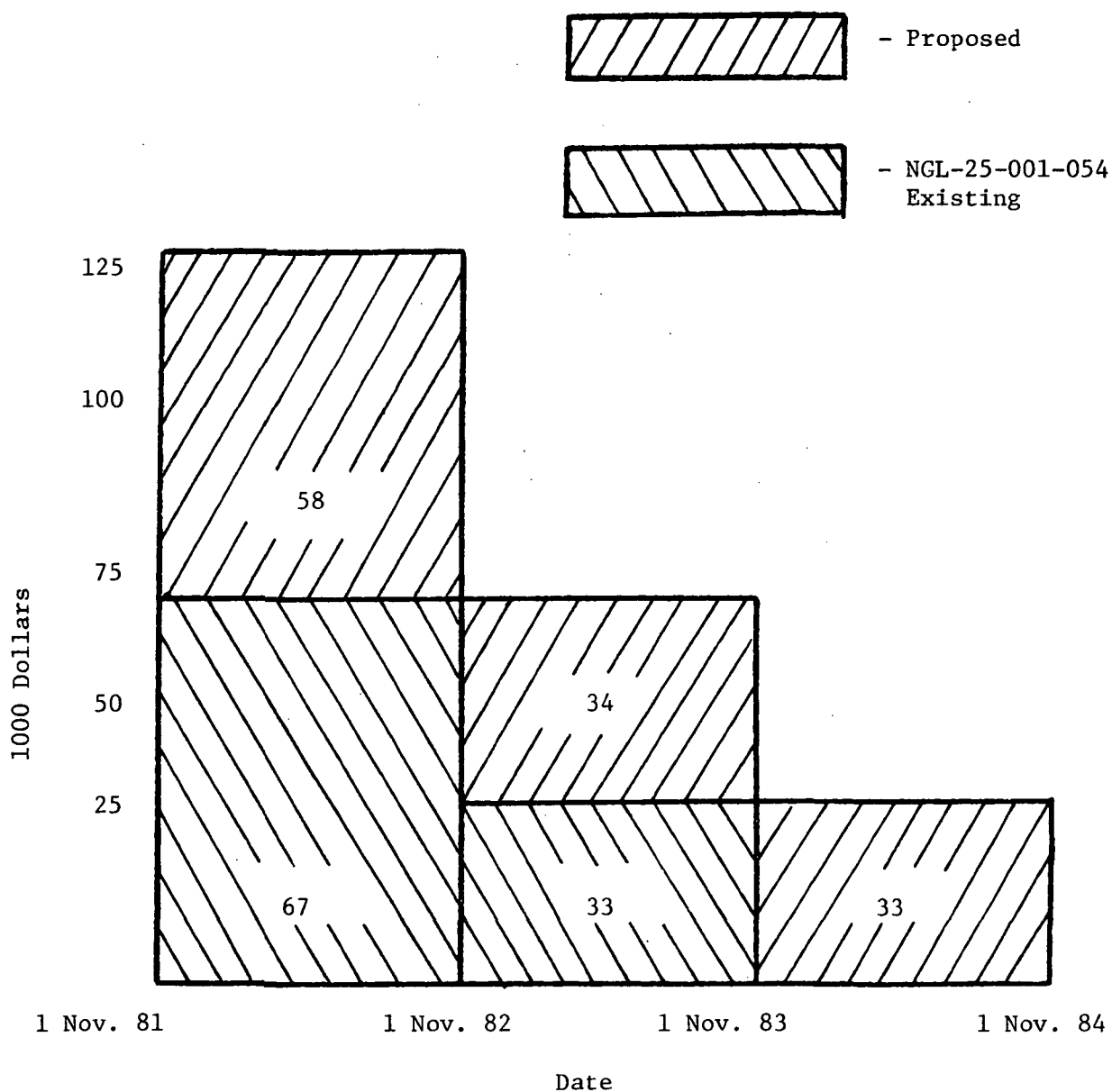
RELEVANCE OF OTHER NASA-HEADQUARTERS GRANTS

Mississippi State University has no other NASA-Headquarters grants with relevance to the Program at this time.

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TOTAL PROPOSED NASA-HEADQUARTERS SUPPORT
FOR MSU STEP-FUNDED GRANTS



Appendix I

RESUME

Name: W. Frank Miller

Department: Forestry

Academic Rank: Associate Professor

Degrees with field, institution and date:

1954 - B.S.F., Forestry, Pennsylvania State University

1955 - M.F., Forest Soils, Duke University

Unfinished - Ph.D., Soils and Geology, Mississippi State University

Experience:

1955-1958, Assistant Forester, Forest Soils Research, Vermont
Agricultural Experiment Station

1960-1962, Instructor, Soils and Photogrammetry, Mississippi State
University

1962-1970, Assistant Professor, Soils, Photogrammetry, Mississippi
State University

1970, Tree Seed Production Consultant, Agency for International
Development - Brasil

1972, Remote Sensing Consultant, Department of the Interior,
President's Interagency Task Force - Florida Barge Canal

1973, Remote Sensing Consultant, Geological Survey of Alabama

1968-1974, Private Consultant, Tropical Forestry

1969-1974, Consultant, Feasibility Studies, Management, Sylvaplex, Inc.

1970-Present, Associate Professor, Land Capability, Remote Sensing,
Mississippi State University

1974-Present, Program Coordinator, Remote Sensing Applications,
Mississippi State University

Membership in scientific, professional and honor societies:

Member of Executive Board, MSU Chapter of American Association
of University Professors, 1965, 1967, 1969, 1971, 1972

Member, Mississippi Academy of Sciences

Member, Society of American Foresters

Member, American Association for the Advancement of Science, 1972-1975

Member, American Society of Photogrammetry, 1973-Date

Member, Task Force, U. S. Department of Agriculture, Southern Forest
Experiment Station, 1974

Vice-Chairman, Committee on Soil Surveys for Forestry Uses. Southern
Regional Technical Work-Planning Conference, 1971-73.

Continued:

Second Vice President, Mid-South Section, American Society of
Photogrammetry, 1975
First Vice President, Mid-South Section, American Society of
Photogrammetry, 1976
President, Mid-South Region, American Society of Photogrammetry,
1977-78
Secretary, Southern Forest Environmental Research Council,
1979-80

Other Activities:

Member, MAFES Weather Committee
Coach and Advisor, MSU Soccer Club, 1969-1978
President, Mississippi Soccer Association, 1973, 1976, 1977
Commissioner, College Division, Mississippi Soccer Association,
1979-80
Copy Editor, RSEMS - Remote Sensing of the Electromagnetic Spectrum.
Journal of the Association of American Geographers. 1977, 1978.
Member, Physiographic Studies Committee, Southern Forest Environmental
Research Council
Member, Committee VII, Remote Sensing, Southern Regional Soil Survey
Work Planning Conference, National Coop. Soil Survey
Member, University Co-Generation Committee
Member, Council on Regional Studies Committee
Member, University Library Committee
Member, Departmental Undergraduate Committee
Member, Mississippi Weed Science Committee

Teaching Responsibilities:

FO 4103 Forest Land Capability Classification
FO 4543 Forest Photogrammetry
FO 5543 Remote Sensing Applications in Resource Management

Graduate Students Supervised:

Gerald Inmon, MSF
Timothy Cannon, MF
Robert Maggio, MSF
Sonia Hathaway, MS, Wildlife & Forestry, Co-Major Professor
John Tingle, MSF
Jonathan Clark, MS, Wildlife & Forestry, Co-Major Professor

Areas of Research Interest:

Land Use Planning
Land Capability Classification
Remote Sensing
Forest Soils
Archeology

Publications:

See Attached

Papers Presented:

See Attached

LIST OF PUBLICATIONS

- Miller, W. Frank and J. W. Starr. 1962. Relationship of soil moisture and hardwood kill. A progress report. Proceedings So. Weed Conf., 15:176-180.
- _____ and _____. 1963. The role of moisture regime in pine and hardwood kill. Proc. So. Weed Conf., 16:223-231.
- _____, _____, and B. J. Stojanovic. 1963. Movement of a urea herbicide and its effect on microbial populations in a forest soil. Proc. Assoc. So. Agr. Workers, 60:73-74.
- _____. 1963. Progress report on the estimation of loblolly pine productivity on Mississippi soils. Miss. Agr. Expt. Sta. Info. Sheet 811.
- _____. 1963. A means of increasing the effectiveness of herbicides used in hardwood control. Miss. Agr. Expt. Sta. Info. Sheet 812.
- _____ and J. W. Starr. 1964. Movement of fenuron in forest soils. Research Report, 17th Ann. So. Weed Conf., p. 125.
- _____ and J. W. Starr. 1966. Hardwood control as related to phenological development and growth rate of loblolly pine. Proc. So. Weed Conf., 19:276-279.
- _____ and J. W. Starr. 1966. Picloram resistance in soil. Research Report, 19th Ann. So. Weed Conf., p. 217.
- Starr, J. W. and W. F. Miller. 1966. Response of woody plants to picloram. Research Report, 19th Ann. So. Weed Conf., p. 217.
- Miller, W. Frank. 1966. Review of "Forest-Soil Relationships in North America," in Journal of Forestry, 64: p. 24.
- _____. 1966. The forest managers need for forest soils information. Paper presented at the So. For. Environ. Research Council, Clemson University. Reproduced in part, 1966 Proc. So. Reg. Tech. Work-Planning Conf., Coop. Soil Survey.
- _____. 1966. Seasonal discoloration of loblolly pine foliage. Forest Sci., 12(3):296-297.
- _____. 1966. Volume changes in bulk density samples. Soil Science, Vol. 102(5):300-304.

LIST OF PUBLICATIONS - Continued

- _____. 1966. Ground water regulation in the Coastal Flatwoods of Mississippi. Miss. Water Resources Res. Inst., Miss. State Univ., 8 pp.
- _____. 1966. Some aspects of water balance in the Gulf Coastal Flatwoods. Proc. Miss. Water Res. Conf., pp. 83-93.
- _____. 1966. Soil-site predictions for loblolly pine in Mississippi. Miss. Ag. Expt. Sta. Info. Sheet 951.
- Miller, W. Frank and J. W. Starr. 1967. Interactions between fenuron and environmental factors: 1. Toxicity as related to method of application and site. Proc. So. Weed Conf. 20:200-205.
- _____. 1967. Physical and chemical properties of forested soils. Miss. Ag. Expt. Sta. Bul. 734, 112 pp.
- _____. 1968. Review of "Life Zone Ecology," in Forest Science, 14:382.
- _____. 1968. Species Diversity, Soil Drainage Class, and Productivity within a Southern Floodplain Forest Community. Jour. of the Miss. Academy of Sciences. Vol. 14.
- _____. 1969. Forest site amelioration in the Coastal Flatwoods of Mississippi. Water Resources Res. Inst., Miss. State Univ., 17 pp.
- _____. 1969. Water characteristics of forested soil profiles. Miss. Ag. Expt. Sta. Bul. 55, 18 pp.
- _____. 1970. Regional predictability of cation-exchange capacity by multiple regression. Plant and Soil. 33:721-725.
- _____. 1970. Mecanizacao da exploracao madeireira (corte e transporte). I Seminario Brasileiro de Silvicultura, Parque Nacional de Itatiaia, RJ, Brasil. 3 pp. mimeo. Reprinted in Flora 1:16-17, Rio Brasil.
- _____. 1970. Um programa de producao de sementes florestais para O Brasil. I Seminario Brasileiro de Silvicultura, Parque Nacional de Itatiaia, RJ, Brasil, 9 pp. mimeo, in Portuguese.
- _____. 1970. Problemas sobre pesquisas em areas destinadas a producao comercial de sementes em Pinus. I Seminario Brasileiro de Silvicultura, Parque Nacional de Itatiaia, RJ, Brasil. 9 pp. mimeo.

LIST OF PUBLICATIONS - Continued

Miller, W. Frank and R. Rodney Foil. 1970. Extensao florestal. I Seminario Brasileiro de Silvicultura, Parque Nacional de Itatiaia, RJ, Brasil. 3 pp. mimeo.

_____ and _____. 1970. Report on forest tree seed production and forest extension; to the Instituto Brasileiro de Desenvolvimento Florestal. 45 pp. English and Portugese.

Miller, W. Frank and Hardeep S. Bhullar. 1971. Water management implications of the South's Third Forest. Proc. Miss. Water Res. Conf., 41-49.

_____. 1972. Periodo de estratificacao papa Pinus elliottii. Floresta, Ano III, No. 2:83-85.

_____. 1973. Vegetative Index - A method of site classification. Jour. Miss. Academy of Sciences. Vol. 19, p. 185.

Miller, W. Frank, Arner, D., Wolfe, J. L., Altig, R. and J. R. Watson. 1973. An Ecological Study of the Tennessee-Tombigbee Waterway. Institute of Environmental Studies, Miss. State University. 125 pp, 49 tbl., 9 fig., 7 app.

_____. 1973. Interpretation of Aerial Data for Ecological Evaluations - The Tennessee-Tombigbee Waterway. In "Remote Sensing for Environmental Analysis," Office of the Chief, U. S. Corps of Engineers.

_____. 1974. Remote Sensing - A Valuable Tool for our Environment. Miss. Res. Highlights, Miss. Ag. & Fo. Expt. Sta., Mississippi State, MS.

Cannon, Timothy K. and W. Frank Miller. 1974. The delineation of forest habitat with remotely sensed data. Proc. Third Annual Remote Sensing of the Earth Conf. Univ. of Tenn. Space Institute, Tullahoma, TN. Vol. III.

Miller, W. Frank. 1974. Aerial photos help county mapping, MAFES Research Highlights, April.

Miller, W. Frank, Walls, M. D., and Crawford Blakeman. 1974. Applications of remote sensing in archeological site identification. Inst. for Environ. Studies, Miss. State University, 21 pp.

LIST OF PUBLICATIONS - Continued

- Miller, W. Frank, Taylor, Calvin L., and Michael R. Miller. 1974. The application of remote sensing to the identification of potential recreation sites along the Tennessee-Tombigbee River: Aberdeen, Miss. to Gainesville, Ala. Inst. for Environ. Studies, Miss. State Univ., 11 pp.
- Whisler, F. D., Young, J. D., Cannon, T. K. and W. Frank Miller, 1974. Aerial surveillance of water quality. Agron. Abstracts, p. 41.
- Walls, M. D. and W. Frank Miller. 1975. The use of aerial photographs in archeological site location: an upper central Tombigbee Valley application. Southeastern Archeological Conf. Bul. 18:247.
- Miller, W. Frank, Whisler, F. D., Robinette, H. R., Finnie, D., and T. Cannon. 1975. The use of hand-held 35 mm color infrared imagery for estimates of suspended solids. Fourth Annual Remote Sensing of Earth Res. Conf., Tullahoma, Tennessee. Vol. IV: 469-480.
- Robinette, Randall, Miller, W. Frank, et. al. 1975. Aerial Surveillance to Monitor Water Quality in Catfish Ponds. Proc. SE Assoc. Game & Fish Comm. Vol. 29:287-293.
- Sadar, Steven A. and W. Frank Miller. 1976. Development of a Risk-Rating System for Southern Pine Beetle Infestation in Copiah County, Mississippi, Remote Sensing of Earth Res., Vol. V:277-294.
- Carter, Bradley D., Miller, W. Frank, and Jerry Harris. 1976. Computer-Assisted Land Use Planning for a State Park. Proc. SE Reg. ACM Conf., Vol. 14:285-291.
- Miller, W. Frank. 1977. Maximizing Impact of Technology Transfer. Proc. Remote Sensing Applic. Workshop, 73rd Annual Meeting, Assoc. Amer. Geogr., Salt Lake City. April, pp. 5-12.
- Lofton, J. A. and W. F. Miller, 1977. An inexpensive method of data management. Jour. Miss. Acad. Sci., XXII:18-24.
- Miller, W. Frank. 1979. Remote Sensing Applications in Archeological Investigations: Sharpley's Bottom, Vinton, Barton and Colbert, Mississippi. Final Report to Interagency Archeological Services, Atlanta, Georgia. Center for Environmental Studies, Miss. State Univ., 82 pp., 13 fig., 5 tables.

LIST OF PUBLICATIONS - Continued

Miller, W. Frank and Bradley D. Carter. 1979. Rational Land Use Decision-Making: The Natchez State Park. Remote Sensing of Environ. 8:25-38.

Solomon, J. L., Miller, W. F. and D. A. Quattrochi. 1979. Development of a tree classifier for discrimination of surface mine activity from Landsat digital data. Proc. Amer. Soc. Photo/Amer. Congress of Surv. and Mappers. Washington, D.C., March 21-23, 1979.

RECENT SEMINAR PARTICIPATION AND PAPERS PRESENTED

Application of Satellite Data in Agriculture and Forestry - Geological Survey of Alabama. Tuscaloosa, Alabama, February, 1973 and Mobile, Alabama, March, 1973.

Applications of Remote Sensing in Ecological Studies - NASA, Mississippi Test Facility, May, 1972.

The ERTS 1 Benefit-Cost Conference, USDI, Geological Survey, EROS Program, Mississippi Test Facility, July, 1973.

The Use of Satellite Imagery for Land Capability Classification, Southern Forest Environment Research Council, Stillwater, Oklahoma, July, 1973.

Forestry Applications of Remote Sensing, University of Southern Mississippi, June, 1973.

Remote Sensing in Forest Inventory and Pest Detection, Southern Forest Insects Work Conference, August, 1973.

Remote Sensing in Land Use Planning. Miss. Chapter, Amer. Soc. Agron., Jackson, Mississippi, February, 1974.

Applications of Remotely Sensed Data in Land Management. Miss. Soc. Farm Managers and Rural Appraisers. Miss. State Univ., March, 1974.

Remote Sensing and Land Use Potentials. Miss. Assoc. Farm and Land Brokers. Starkville, Miss., May, 1974.

The Use of Remotely Sensed Data in Land Capability Classification. The Remote Sensing Workshop, Miss. State Univ., May 21-24, 1974.

Mapping Physiography From ERTS Imagery. Southern For. Environ. Research Council. Georgetown, S. C., August, 1974.

Southeast River Basins Inter-agency Committee. Atlanta, Ga., The Use of Remote Sensing in River Basin Assessment.

U. S. Forest Service - Soil & Water Workshop. Memphis, TN, October, 1974. New Techniques in Resource Analysis.

Characteristics of "High-Risk" Beetle Stands, by W. Frank Miller and Steven A. Sader. A Paper Presented at the 3rd Annual Remote Sensing Symposium, University of Southern Mississippi, April, 1975.

RECENT SEMINAR PARTICIPATION AND PAPERS PRESENTED - Continued

Participation in the Presentation of Two, One-Week Workshops Jointly Sponsored by the EROS Program and the MSU-LSU Logging Center. 1975 and 1976.

Miller, W. Frank. 1975. Remote Sensing Applications in Environmental Impact Studies, Am. Soc. Photo. Remote Sensing Symposium, Athens, Georgia.

Miller, W. Frank, Taylor, C. L., and M. E. Miller. 1975. Remote Sensing Applications in Recreation Site Location. Am. Soc. Photo. Remote Sensing Symposium, Athens, Georgia.

Habitat-Vegetation Mapping by Remote Sensing. 38th Annual Meeting, Assoc. SE Biologists, Raleigh, N. C., April 1977.

State-Level Applications of Remote Sensing. Joint House-Senate Forestry Committee, October 1977.

A Rational Basis for Land-Use Decision-Making: A Workshop for Resource Managers, July 5-7, 1978. Sponsored by the Marshall Space Flight Center.

A Remote Sensing Workshop for University Faculty Members, August 14-18, 1978. Sponsored by NASA/Earth Resources Laboratory, Slidell, Louisiana.

A Remote Sensing Workshop for University Faculty Members, January 7-11, 1979. Sponsored by NASA/Earth Resources Laboratory, Slidell, Louisiana.

Computerized Data Base for Lowndes County, Mississippi: Workshop for Elected Officials and Representatives of State and Federal Agencies, March 22, 1979.

J. L. Solomon
 Department of Mathematics
 Mississippi State University
 Mississippi State, MS 39762
 Telephone: 325-3414 (office)
 323-9395 (home)

1. PERSONAL:

Born: October 3, 1941; Milan, Tennessee

Married: Wife - Margaret D.
 Son - Lloyd Alan (June 15, 1967)
 Daughter - Marjorie Dawn (December 10, 1969)

Height: 5 ft. 11 in.; Weight: 215 pounds

Religion: Methodist

Home Address: 22 Eutaw Street
 Starkville, Mississippi 39759

2. EDUCATIONAL:

<u>College Attended</u>	<u>Degree</u>	<u>Major/Minor</u>
University of Mississippi '64	B.S.	Mathematics/English
Mississippi State University '66	M.S.	Mathematics
M.S. Thesis: "On the Generalized Inverse of a Singular Matrix"		
Texas A & M University '72	Ph.D.	Mathematics
Ph.D. Dissertation: "Some Results in Nonlinear Fixed Point Theory"		

3. MEMBERSHIPS:

American Mathematical Society
 Phi Kappa Phi
 Phi Eta Sigma
 Kappa Mu Epsilon
 Mississippi Academy of Sciences

4. EXPERIENCE:

Sept. 1978 - Present	Associate Professor of Mathematics Mississippi State University
Sept. 1975 - 1978	Assistant Professor of Mathematics Mississippi State University
Summer 1975	NASA-ASEE Faculty Research Fellowship Johnson Space Center, Houston, TX
Summer 1974	NASA-ASEE Faculty Research Fellowship Johnson Space Center, Houston, TX
Sept. 1972 - May 1975	Assistant Professor of Mathematics Texas A & I University
Jan. 1971 - May 1972	Instructor of Mathematics Texas A & M University
Sept. 1969 - Jan. 1971	Graduate Student, Department of Mathematics, Texas A & M University NASA - Traineeship
Sept. 1968 - Sept. 1969	Graduate Student, Department of Mathematics, Texas A & M University, Non-Teaching Assistantship
Sept. 1967 - Sept. 1968	Graduate Assistant, Department of Mathematics, Texas A & M University
Sept. 1966 - Sept. 1967	Instructor of Mathematics Mississippi State University
Sept. 1965 - Sept. 1966	Graduate Assistant Mississippi State University
Aug. 1964 - Sept. 1965	Assistant Mathematician Aerophysics Department Mississippi State University

5. JOURNAL PUBLICATIONS:

1. (with L. F. Guseman, Jr.) Subsequential Limit Points of Successive Approximations, *Proceedings of the American Mathematical Society*, Vol. 34, 1972, pp. 573-577. MR45#7692.
2. A Note on the Extension of Contractive Mappings, *Proceedings of the American Mathematical Society*, Vol. 40, 1973, pp. 319-322. MR48#1145.
3. (with Peters, B. Charles, Jr.) A Note on Optimum Linear Feature Extraction for Gaussian Populations with Equal Covariances and Equal *a priori* Probabilities, *Communications in Statistics*, Vol. A5, (12), 1976, pp. 1137-1142. MR55#1633.
4. A Note on Attractors for Compact Sets, *Proceedings of the American Mathematical Society*, Vol. 65, No. 2, 1977, pp. 293-296.
5. (with T. F. McCabe and B. Charles Peters, Jr.) On Successive Approximation, *Proceedings of the NSF Regional Conference on Numerical Analysis*, Jackson State University, 1977, pp. 80-91.
6. (with L. Janos) Even Continuity and the Banach Contraction Principle, *Proceedings of the American Mathematical Society*, Vol. 69, No. 1, 1977, pp. 166-168. MR58#18398.
7. (with L. Janos) A Fixed Point Theorem and Attractors, *Proceedings of the American Mathematical Society*, Vol. 71, No. 2, 1978, pp. 257-262. MR58#2772.
8. (with W. F. Miller and D. A. Quattrochi) Development of a tree Classifier For Discrimination of Surface Mine Activity From Landsat Digital Data, *Proceedings of the American Society of Photogrammetry*, Vol. 11, 45th Annual Meeting, pp. 607-613.
9. (with Jack C. Slay) A Note on the Cauchy-Schwarz Inequality, *The Two-year College Mathematics Journal*, Vol. 10, No. 4, 1979, pp. 280-281.
10. (with Jack C. Slay) A Mean Generating Function, *The Two-year College Mathematics Journal*.
11. (with Ludvik Janos and Roger C. McCann) Nonexpansive Uniformly Asymptotically Stable Flows Are Linear, *Canadian Mathematical Bulletin*,

6. PAPERS PRESENTED:

1. Conference on Pattern Recognition, Pan American University Nov. 1-2, 1974, "Optimum Linear Feature Extraction for Gaussian Populations with Equal Covariances and Equal *a priori* Probabilities".
2. 53rd Annual Joint Meeting Math. Assoc. of Amer., La.-Miss. Section, Biloxi, Mississippi, February 13-14, 1976. "A Note on Attractors for Compact Sets".
3. Annual Meeting of the Texas Section of the Math. Assoc. of America, Texas A & M Univ., April 2-3, 1976. (with T. F. McCabe) "An Iterative Scheme for Estimating an Affine Transformation".
4. 83rd Annual Meeting of the AMS, St. Louis, MO., Jan. 27-31, 1977. "Contractive mappings and attractors for compact sets".
5. 54th Annual Joint Meeting Math. Assoc. of Amer., La.-Miss. Section, New Orleans, LA., Feb. 25-26, 1977. "A Remark on a Result of Phillip R. Meyers".
6. NSF Regional Research Conference on Numerical Analysis, Jackson State University, October 10-14, 1977, "On Successive Approximation".
7. 84th Annual Meeting of the AMS, Atlanta, GA., January 3-8, 1978. (with L. Janos) "A Fixed Point Theorem and Attractors".
8. 55th Annual Joint Meeting Math. Assoc. of Amer., La.-Miss. Section, Biloxi, Miss., Feb. 17-18, 1978. "Subsequential Limit Points of a Continuous Function".
9. Purdue University, LARS Short Course on Advanced Topics in the Analysis of Remoted Sensing Data, April 10-14, 1978, "Feature Selection".
10. 85th Annual Meeting of the AMS, Biloxi, MS, January 24-28, 1979. "Structure of the set of subsequential limit points".
11. 45th Annual Meeting of the ASP and ACSM, Washington, D.C., March 18-24, 1979. "Development of a Tree Classifier for Discrimination of Surface Mine Activity from Landsat Digital Data." (With W. F. Miller and D. A. Quattrochi.)

7. ABSTRACTS PUBLISHED:

1. Contractive Mappings and Attractors for Compact Sets, #742-54-21, *Notices of the A.M.S.* 24, Jan. 1977, pp. A-143.
2. (with L. Janos), A Fixed Point Theorem for Operators with a Compact Iterate, #77T-G29, *Notices of the A.M.S.* 24, Feb. 1977, pp. A-260.
3. (L. Janos), A Fixed Point Theorem and Attractors, #752-47-32, *Notices of the A.M.S.* 25, January 1978.
4. Structure of the set of subsequential limit points, #763-54-25, *Notices of the A.M.S.* 26, January 1979.

8. OTHER INFORMATION:

A. Refereeing and Reviewing:

1. Referee for *The Proceedings of the American Mathematical Society*.
2. Referee for *Canadian Mathematical Bulletin*.
3. Reviewer for *Mathematical Reviews*.
4. Presiding Officer at Session for Contributed Papers on Functional Analysis. 85th Annual Meeting of the American Mathematical Society, Biloxi, MS, Jan. 24-28, 1979.

B. Grants and Contracts:

1. Faculty Research Grant - Texas A&I University, Spring, 1974
Title: *Attractors for Compact Sets*
2. Faculty Research Grant - Mississippi State University, Summer 1977 (\$1087.50)
Title: *Updating of the Mathematics Package*
This project was directed to improving and expanding the library of mathematical programs for the University's UNIVAC 1108.
3. NASA Grant NAS13-93 (\$25,000)
Program Coordinator: W. Frank Miller
Title: *A Remote Sensing Short Course for University Faculty Members*
4. NASA Grant NGL-25-001-054 (\$100,000/year)
Program Coordinator: W. Frank Miller
Grant obtained by W. Frank Miller. Since 1977, I have received 25% support from the contract. I am responsible for evaluation and development of different classification routines plus serving as the principal investigator for a project dealing with the monitoring of strip mining activity using satellite data.

5. Consultant - Battelle Columbus Laboratories,
Contract Number DAAG29-76-D-0100
Title: *Detailed Analysis and Evaluation of a Computer
Code Used to Describe Heat Flow in Terrain
Materials*

C. Conferences and Workshops:

1. Funded participant in NSF Regional Conference on Numerical Analysis, Jackson State University, October 10-14, 1977
2. Attended short course on remote sensing, March 6-10, 1978, at Earth Resources Laboratory; Slidell, Louisiana.
3. Attended LARS short course: *Advanced Topics in the Analysis of Remote Sensing Data*; Purdue University, April 10-14, 1978
4. Invited talk entitled *Remote Sensing: Technical Aspects and Applications in Mississippi and the Southeast*, Sigma Xi Meeting, Nov. 16, 1978, University Medical Center, Jackson, MS.
5. Attended symposium: *Machine Processing of Remotely Sensed Data*; Purdue University, June 26-28, 1979.
6. Invited talk entitled *Preparing Mathematics Majors for Non-academic Employment*; Gulf Regional Interstate Collegiate Consortium Workshop, Sept. 28, 1979, Jones County Junior College, Ellisville, MS.
7. Invited participant at NASA Scene Modeling Workshop. Jan. 23-25, 1980. U. S. Army Engineers Waterways Experiment Station, Vicksburg, MS. This workshop was concerned with developing a list of researchable problems, prioritizing these problems and identifying possible sources of expertise to tackle these problems.

9. TEACHING:

1. Undergraduate courses: I have taught most of the precalculus courses and each of the calculus courses. The post-calculus courses include Differential Equations, Linear Algebra, Introduction to Modern Algebra, Advanced Mathematics for Engineers, Multivariable Calculus, and Advanced Calculus.
2. Graduate courses: Functional Analysis, Matrices and Linear Algebra, Mathematical Physics, Measure and Integration, Numerical Analysis, Numerical Solutions of Ordinary Differential Equations, and Real Analysis.
3. Seminars: Topology, Matrix Analysis, Calculus on Manifolds, Mathematical Economics, Optimization Theory.
4. Master's Theses Directed:
 - (1) James Rodney Jee, (M.S., May, 1978) "One-Point Iterative Functions for the Solution of Nonlinear Equations Involving One Real Variable".

10. SERVICE: (MSU)

Department:

1. Committee to consider non-thesis option for Master of Science degree in Mathematics.
2. Chairman of Colloquim Committee for department (1976-1979).
3. Elected to departmental committee to establish criteria for tenure and promotion (1979).
4. Departmental Interdisciplinary Committee.
5. Several textbook committees.
6. Search Committee for department head (1979-80).
7. Committee to set up department's aims and goals for the next five years (1979-80).

College:

1. Ad Hoc Committee on Purposes and Aims for the College of Arts and Sciences (1979-80).
2. Arts and Sciences Curriculum Review Steering Committee.
3. Elected to Arts and Sciences Tenure and Promotion Committee (1979-80).

University:

1. Elected to Faculty Council (1978-1980).
 - a. Academic Affairs Committee
 - b. Ad Hoc Committee for faculty involvement in budgetary matters.
2. Who's Who Selection Committee (1978-79) & (1979-80).

PROFESSIONAL RESUME'

NAME:

Sidney G. Williams
Assistant Professor
Department of Computer Science
Mississippi State University

EDUCATION:

B.S. in Electrical Engineering, Mississippi State University, 1965
M.S. in Electrical Engineering, University of New Mexico, 1967
Minor in Probability Theory and Statistics
Ph.D. in Electrical Engineering, Mississippi State University, 1978
Minor in Mathematics

TEACHING EXPERIENCE:

Instructor, U. S. Army, 1958-60
Instructor, RCA, 1961, 62
Instructor, Mississippi State University, 1969-72
Graduate Assistant, Mississippi State University, 1973-75
Instructor, Mississippi State University, 1975-79
Assistant Professor, Mississippi State University, 1979-present

FULL-TIME INDUSTRIAL EXPERIENCE:

Sandia Corporation, 1965-69, Technical Staff Member
Integrated Sound Systems, Inc., 1972-73, Design Engineer

PROFESSIONAL AND HONOR SOCIETIES:

Association for Computing Machinery
Tau Beta Pi
Upsilon Pi Epsilon
Phi Kappa Phi

PUBLICATIONS:

"Feedback Communications Using Coding in the Forward Link," Ph.D.
Dissertation, Mississippi State University, 1978.

PROFESSIONAL EXPERIENCE:

Mississippi State University
Professional Activities

I have developed and implemented several path searching algorithms on various research contracts with the U. S. Army Corps of Engineers. I have developed two data compression schemes to improve the efficiency of computer routines which handle large amounts of data. I

developed a rapid file search routine to increase the efficiency of a program using Univac FORTRAN sequential files. I have written system processors for general use on the Univac computer at MSU. These include a BKUP processor with several utility routines for maintaining a file backup list, the TIME processor, and the SITE processor. I am presently involved in development of a graphics operating system for the Data General S130 Eclipse computer and Lexidata 6400 color-graphics display system. Other activities include general consulting to Univac 1106 and DG S130 users.

Academic Activities

I have taught courses at the undergraduate level in Electronics, Engineering Mechanics, Computer Organization, Systems programming, and FORTRAN programming. I have also taught various short courses for the Mississippi State University Computing Center.

SUMMARY OF INDUSTRIAL ACTIVITIES:

Sandia Corporation

Supervisor - Mr. C. R. Alls

Technical Staff Member - I was responsible for design of various tests and test equipment for prototype weapons components.

Integrated Sound Systems, Inc.

Design Engineer - I was responsible for design of electronic amplifying equipment for the company in which I was part owner.

Resume

Jonathan Richard Clark
 301 Central Street
 Starkville, MS 39759
 (601)-323-5008 Home
 (601)-325- 3760/2946 Bus.

Personal Born: 19 February 1951 Height: 5' 9"
 Health: Excellent Weight: 160 lbs

Education Mississippi State University, Starkville, MS
 Degree: Master of Science (10/80)
 Major: Remote Sensing of Natural Resources
 Major Subjects: Ecology of Wildlife Habitats, Remote
 Sensing, Statistics, Plant Ecology.

Cornell University, Ithaca, New York
 Degree: Bachelor of Science (6/73)
 Major: Wildlife Science
 Major Subjects: Wildlife and Vertebrate Ecology,
 Remote Sensing, Analytical Ecology, Communication Arts.

Work Experience

1. Graduate Assistant. Department of Forestry, Mississippi State University, Starkville, MS
 Aug 1978 to Oct 1980
 Immediate Supervisor: Prof. W. Frank Miller
 Duties: Design and conduct of research concerning digital Landsat satellite analysis of forest vegetation. Air photo flight planning and supervision. Planimetric mapping. Ground truth operations. Construction and utilization of a multi-level data base for natural resources analysis. Classroom instruction, photogrammetry.

2. Wildlife Biologist. Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
 January 1975 to Present. **
 Immediate Supervisor: Dr. Walter B. Gallagher
 Duties: Interagency coordination of remote sensing applications projects, design and management of a data storage and retrieval system, biological field studies, watershed management planning study.

3. Research Aide. Resource Information Laboratory, Cornell University, Ithaca, New York.
 January 1974 to November 1974.
 Immediate Supervisor: Dr. Ernest E. Hardy
 Duties: Air photo interpretation and mapping of the wetlands of New York State, wetlands field studies, aerial studies of beaver impoundments.

** Service with this agency from January 1975 to November 1977 was while on active duty, U.S. Army; service from November 1977 to August 1978 was full-time civilian duty; service from March 1979 to present has been as part-time intermittent civilian while at graduate school (#1. above).

Resume

Jonathan Richard Clark

4. Bulldozer Operator and Laborer. New York State Department of Environmental Conservation.

July 1973 to November 1973.

Immediate Supervisor: Gary Vandernuit

Duties: Stream improvement projects in the central New York area.

5. Wildlife Field Technician. Cooperative Wildlife Research Unit, Cornell University, Ithaca, New York.

Senior year at Cornell University (1972-1973)

Duties: Small mammals population studies on the Montezuma National Wildlife Refuge, small mammal autopsies, library search for The Journal of Wildlife Management.

6. Environmental Instructor. Teaching practicum in environmental studies at the fifth and sixth grade levels.

Senior year at Cornell University (1972-1973)

Teaching Advisor: Dr. Verne N. Rockcastle

Duties: Classroom teaching and projects, preparing and leading field trips.

Organizations

American Society of Photogrammetry

The Wildlife Society

Research and Career Interests

Applications of Remote Sensing and Computer Technologies to

Natural Resources Analysis and Management

Data Management Systems

Digital Image Analysis

Military Service

November 1974 to November 1977: Active Duty, U.S. Army, served at the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS
Duties: Remote Sensing Specialist.

July 1978 to Present: Reserve Duty, U.S. Army, serving with the 412th Engineer Command, Vicksburg, MS. Duties: Terrain Intelligence Analyst.

MAILING ADDRESS AND PHONE:

Drawer CS
Computer Science Dept.
Mississippi State, MS 39762
(601)325-6030 - 325-6071

PERSONAL RESUME

NAME: John Stephenson Powers

BIRTHDATE: [REDACTED]

BIRTHPLACE: [REDACTED]

SEX/MARITAL STATUS: Male; Single

PERSONAL: Height 5'8.5" Weight 135 lbs. Hair brown Eyes brown.

EDUCATION

June 1978 to Present: Mississippi State University
Mississippi State, Mississippi 39759

Anticipated Degree: M.S. Computer Science

Thesis Topic: Software development and implementation for an entropy-based Landsat textural classifier for use in forest physiognomy classification

Major Interests: Programming languages and techniques; micro/mini/mainframe and system hardware and software; computer applications to remote sensing, image classification and picture processing; textural information band synthesis from Landsat data; creation and management of geobase information systems

Sept 1977 to May 1978: Boston University
Commonwealth Avenue
Boston, Massachusetts 02215

Uncompleted Degree: PhD. Geography

Major Paper: "Entropy and Economics - Survey and Planetary Implications"

Major Interests: Cartography; computer applications to cartography; urban theory and applications to planning and traffic control; general systems theory in economics, biology and evolution

Reason for leaving: Reassessment of career objectives; economic and social reality vs academic idealism

Jan 1975 to Aug 1977: East Tennessee State University
Johnson City, Tennessee 37601

Degree: M.A. Geography

Sept 1977 to Dec 1977: Lab Instructor - Physical Geography
 Department of Geography
 Boston University
 Boston, Massachusetts 02215

Duties: Clarify and explain basic principles of physical landscape formation, climatology and weather, global ecology in an industrialized planet; give lab projects and evaluate; grade tests

Jan 1975 to Aug 1977: Research Assistant
 Department of Geography
 East Tennessee State University
 Johnson City, Tennessee 37601

Duties: Grade tests, conduct literature searches; course lecturer in cultural geography, create tests, give grades

June 1977 to Aug 1977: Steed College
 Bristol-Kingsport Blvd.
 Johnson City, Tennessee 37601

Duties: Course lecturer in cultural geography, create tests, give grades

July 1976 to July 1977: Display person
 Sears Roebuck and Company
 Johnson City, Tennessee 37601

Duties: Arrange retail merchandise for display to public

June 1972 to Aug. 1972: Lockwood and Tillet Bridge Contractors
 Franklin, Tennessee

Duties: Laborer on high span bridge project

June 1969 to Aug 1969: Assistant
 Kingsport Waste Water Treatment Plant
 Industry Drive
 Kingsport, Tennessee 37660

Duties: Maintain facilities and grounds, assist operators

Thesis: Information, Entropy and the Cybernetic Landscape" suggests a quantifiable relationship between economic development of a landscape and principles of thermodynamics as approached via information theory. The study utilized digitized medium altitude remote sensor imagery and achieved positive results as well as suggesting a computer algorithm to facilitate further investigations along similar lines.

Major Interests: Location theory, resource management, soils

Minor Interests: Information theory, cybernetics, philosophy of science
general systems theory

Sept 1969 to Aug 1974: University of Tennessee
Knoxville, Tennessee 39716

Degree: B.A. Psychology

Major Interests: Theories of personality and cognition, social psychology; visual perception, especially pattern recognition and color perception

Minor Interests: Geology and astronomy, abstract painting, history of western philosophy and civilization, Indian and oriental philosophy and civilization, philosophy of science

Sept. 1966 to Aug 1969 Dobyms-Bennette High School
Kingsport, Tennessee 37660

Degree: Yes

Major Interests: Art, science

EMPLOYMENT

June 1978 to Present: Remote Sensing Applications Laboratory
Department of Forestry
Mississippi State, Mississippi 39759

Duties: Implementation, documentation and management of geobase information system software; logical structuring and digitization of geographic information databases involving some photointerpretation and application of database to specific problems in planning; creation of new software for special problems; equipment troubleshooting and maintenance

1. Name: John L. Tingle

2. Department: Forestry

3. Age: ■ ■ ■ ■ ■ ■ ■ ■

4. Academic Rank: Research Assistant

5. Education:

1972 - B.S., Forest Management, Mississippi State University

1980 - M.S., Forest Management, Mississippi State University

6. Experience:

Summer of 1968: Summer Trainee program of U.S.D.A., Soil Conservation Service, Brookhaven, MS

Summer of 1969: Summer Trainee program of U.S.D.A., Soil Conservation Service, Philadelphia, MS

Autumn of 1969: Work Semester, Cooperative Education Program, Miss. State Univ. and U.S. Forest Service, Homochitto Ranger District, Gloster, MS

Summer of 1970: Work Semester, U.S.F.S., Gloster, MS

Spring of 1971: Work Semester, U.S.F.S., Gloster, MS

Summer of 1971: Work Semester, U.S.F.S., Gloster, MS

Summer of 1972: Forester Trainee Position, U.S. Forest Service, Gloster, MS

October 1972 : Forester Trainee Position, U.S. Forest Service, Holly Springs National Forest, Holly Springs, MS

May 1974 : Prescriptionist Forester, Holly Springs, MS

October 1975 : Resources Assistant to District Ranger, Bienville National Forest, Forest, MS

December 1977 : Resigned position with U.S.F.S. and entered Graduate School, MS State Univ.

December 1980 to Present: Research Assistant, Department of Forestry, Mississippi State University

7. Memberships:

Society of American Foresters

Alpha Zeta - Honorary Agriculture Fraternity

Xi Sigma Pi - Honorary Forestry Fraternity

8. Publications:

None

VITA

BRADLEY DUKE CARTER

Address:Marital Status: MarriedChildren: 2 girlsEducation:

Mississippi State University	B.S. (Industrial Engineering)	1967
Mississippi State University	M.S. (Industrial Engineering)	1968
University of Arkansas	Ph.D. (Industrial Engineering)	1972

Academic Experience:

1967-68	Graduate Assistant in Industrial Engineering	Mississippi State University
1968-69	Instructor in Computer Science and Industrial Engineering	Mississippi State University
1969-71	Instructor in Industrial Engineering	University of Arkansas
1971-74	Assistant Professor of Computer Science and Industrial Engineering	Mississippi State University
1974-75	Assistant Professor of Computer Science and Industrial Engineering; Associate Director for Computer Science (responsible for under- graduate academic program)	Mississippi State University
1975-76	Associate Professor of Computer Science and Industrial Engineering; Associate Director for Computer Science (responsible for under- graduate academic program)	Mississippi State University
1976-78	Associate Professor of Computer Science and Industrial Engineering; Graduate Coordinator for Computer Science (responsible for graduate academic program)	Mississippi State University
1978-	Associate Professor of Computer Science and Industrial Engineering; Head of the Department of Computer Science	Mississippi State University

Professional Experience:

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1962-66	Student Trainee (Co-op student)	National Aeronautics and Space Administration Langley Research Center Hampton, Virginia
1966-68	Systems Analyst	Mitchell Memorial Library Mississippi State University
1968-69	Engineer Programmer	Tramel Computing Center Mississippi State University
1970	Computer Consultant	Arkansas Soil Characterization Lab, Fayetteville, Arkansas
1971-75	Analyst	Tramel Computer Center Mississippi State University
1975-77	Computer Consultant	Garan, Incorporated Starkville, Mississippi

Memberships:

Association for Computing Machinery (ACM)
Southeastern Representative, Committee on Student Chapters
Membership Chairman, Mid-Southeast Chapter
ACM Special Interest Group for Computer Science Education
ACM Special Interest Group on Information Retrieval
ACM Special Interest Group on Software Engineering
Mississippi Academy of Science
Phi Kappa Phi (Honor Society)
Upsilon Pi Epsilon (Honorary Computer Science Society)
Alpha Pi Mu (Honorary Industrial Engineering Society)
Pi Kappa Alpha

Research Activities:

Computer Analysis of Remotely Sensed Data - current
(NASA Grant NGL-25-001-054)
Numerical Evaluation of Stochastic Functions - current
(Not funded)
Participated in a two-year study for the President of Mississippi State
University on university data management systems. Report submitted
August 28, 1974.

Committees and Other University Related Activities:

Faculty Council 1972-1978
Vice-Chairman 1975-1978
Energy Research Team 1972-73
Registration Committee 1975-
Cooperative Education Committee 1976-
Staff Benefits Committee 1977-78
Chairman 1977-78
Search Committee, Vice President for Business Affairs 1977
Search Committee (Chairman), Head of Data Processing 1978

Search Committee, Head of History 1978
Faculty Advisor, Pi Kappa Alpha Fraternity 1971-76
Faculty Advisor, ACM Student Chapter 1971-76
Faculty Advisor, Upsilon Pi Epsilon 1973-78

Publications and Papers:

- "The Design of Circulation Control and Serials Records Systems for the Mississippi State University Library." M.S. thesis, Mississippi State University, 1968.
- "On the Probability Distribution of Rational Functions of Independent H-function Variates." Ph.D. thesis, University of Arkansas, 1972.
- "Systems Analysis for MIS." A paper presented at the AIIE Mississippi Joint Technical Meeting, Mississippi State, Mississippi, April 1974.
- "Stochastic Function Analysis." A paper presented at the ACM 12th Southeastern Regional Meeting, Nashville, Tennessee, April 29, 1974.
- "Simulation Techniques." A series of four lectures presented at the University of Ljubljana, Yugoslavia and at the University of Belgrade, Yugoslavia, May 1974.
- "Systems Analysis Techniques." A series of four lectures presented at the University of Ljubljana, Yugoslavia and at the University of Belgrade, Yugoslavia, May 1974.
- "Numerical Evaluation of Certain Stochastic Functions." A paper presented at the ACM National Computer Science Conference, Washington, D. C., February 18, 1975. (with M. D. Springer)
- "Library Programming Considerations: A Note on COBOL." Journal of Library Automation; March 1975. (with P. S. Foil)
- "Computer Assisted Land Use Planning for a State Park." A paper presented at the ACM 14th Annual Southeast Regional Meeting, Birmingham, Alabama, April 22-24, 1976. (with W. F. Miller and J. Harris)
- "A Survey of Data Collection Systems for Computer-Based Library Circulation Processes." Journal of Library Automation, September 1976. (with P. S. Foil)
- "The Distribution of Products Quotients and Powers of Independent H-function Variables." SIAM Journal on Applied Mathematics, December 1977. (with M. D. Springer)
- "Remote Sensing and Computer-Assisted Land Use Planning." A paper presented at the ACM Mid-Southeast Summer Meeting, Nashville, Tennessee, July 15, 1977. (with W. F. Miller)
- "Machine Processing of Remotely Sensed Data at MSU." A paper presented at the 1977 Annual Meeting of the Mid-South Region of the American Society of Photogrammetry, Mississippi State, Mississippi, November 4, 1977.

Publications and Papers (continued)

"A Data Management System for Lowndes County, Mississippi: Part I. Rural Land Assessment." Remote Sensing Applications Program Report, Mississippi State University, September 1977. (with W. F. Miller and D. E. Pettry)

"Rational Land Use Decision Making: The Natchez State Park," Remote Sensing of Environment, 1979. (with W. F. Miller)

"A Remote Sensing Short Course for University Faculty Members," Remote Sensing Applications Program Report, Mississippi State University, June 1979. (with W. F. Miller, et.al.)

"The Use of a Landsat-Based Information System by Local Government," In Review. (with W. F. Miller and D. Quattrochi)

Professional Resume
David E. Pettry

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Academic/Scientist Rank: Professor/Agronomist

Professional Assignment:

Time: 100%

Research Percentage: 60%

Teaching Percentage: 40%

Unit: Department of Agronomy, P. O. Box 5248, Mississippi State,
MS 39762

Education:

Degree	Disciplines	University	Date
B.S.	Soil Science	University of Florida	1962
M.S.	Soil Science	University of Florida	1965
Ph.D.	Soil Science	Virginia Polytechnic Institute	1968

Professional Experience:

Soil Scientist, Soil Conservation Service - USDA	1962-1968
Assistant Professor, Virginia Polytechnic Institute	1969-1972
Associate Professor, Virginia Polytechnic Institute & State University	1972-1975
Professor, Mississippi State University	1975-present

Areas of Interest and Specialization:

Pedogenesis, Soil classification & morphology, clay mineralogy, environmental analyses, remote sensing, soil reclamation, geomorphology.

Professional Goals:

Research: Characterize and establish genetic relationships of soils of Mississippi; relate pedogenesis to geomorphic surfaces; establish soil behavior under various uses; define soil dynamic ecosystems.

Teaching: Strive to motivate students to achieve their academic potential; stimulate students to develop innovative thinking and problem solving; prepare students to function in society and make contributions.

Service: Inform, educate and stimulate interest in the understanding and proper use of soil resources; work with governmental and public agencies and organizations for the wise utilization of soil resources.

Professional Honorary Societies:

American Society of Agronomy, Soil Science Society of America, Clay Minerals Society, Soil Conservation Society of America, Virginia Academy of Science, Mississippi Academy of Science, Mississippi Professional Soil Classifiers Association; Phi Kappa Phi, Sigma XI, Alpha Zeta, Gamma Sigma Delta, Phi Sigma Honor Societies

Grant and Contract Support:

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<u>Organization</u>	<u>Title of Program</u>	<u>Dates</u>	<u>Amount</u>	<u>Title</u>
U.S. Army Corps of Engineers	Economic Effects of Flood Control	1977-78	\$ 8,000	Co-Invest.
U.S. Army	Decontamination of Combat Wounds	1975-76	\$ 9,600	Prin. Invest.
N.A.S.A	Remote Sensing in Agriculture	1971-75	\$ 500,000	Prin. Invest.
VA Dept. of Health	Soil Pollution	1970-75	\$ 150,000	Prin. Invest.
U.S. Army	Decontamination of Combat Wounds	1971-75	\$ 50,000	Prin. Invest.
U.S. Army Corps of Engineers	Environmental Analyses of Dams	1973	\$ 12,000	Prin. Invest.
VA Soil & Water Comm.	Accelerated Soil Survey Program	1973-75	\$180,000/yr	Prin. Invest.

PUBLICATIONS:Journal Articles

- Petty, D. E., V. W. Carlisle, and R. E. Caldwell. 1965. Spodic Horizons in Selected Leon and Immokalee Soils. Soil and Crop Sci. Soc. of Florida 25:160-172.
- Furman, A. L., H. O. White, D. E. Petty. 1970. Soil Survey of Seminole County, Florida. U.S. Dept. Agriculture, Washington, D. C., pp. 81 and maps.
- McCollum, S. H., R. F. Pendleton, E. S. Van Atta, D. E. Petty. 1971. Soil Survey of Okeechobee County, Florida. U.S. Dept. Agriculture, Washington, D. C., pp. 61 and maps.
- Petty, D. E. and C. I. Rich. 1971. Modification of Certain Soils by Calcium Hydroxide Stabilization. Soil Sci. Soc. Amer. Proc. 35:835-838.
- Wilfong, R. T., D. E. Petty, and D. J. Parks. 1972. Cheap Land is not Always Cheap. J. School Management 16:32-33.
- Van Atta, E., S. L. Stem, D. E. Petty. 1972. Soil Survey of Pinellas County, Florida. U.S. Dept. Agriculture, Washington, D. C.
- Smith, R., D. E. Petty, and C. B. Breinig. 1973. Inceptisols-Weakly Developed Soils. Southern Cooperative Series Bulletin No. 174;33-42.
- Petty, D. E., R. B. Reneau, Jr., M. I. Shanholtz, S. A. Graham, and C. W. Weston. 1973. Soil Pollution and Environmental Health. J. Health Services Reports 88:323-327.
- Petty, D. E. and W. J. Meyer. 1973. Soil Information Need Grows. J. Virginia Professional Engineer. September, 1973; 22-23.
- Petty, D. E. and C. S. Coleman. 1974. Two Decades of Urban Soil Interpretation in Fairfax County, Virginia. J. Geoderma 10:27-34. Amsterdam, Netherlands.
- Petty, D. E. and R. B. Reneau, Jr. 1974. Soil Pollution and Environmental Health Implications. Public Health Reviews 3:225-336. Tel Aviv, Israel.
- Rodeheaver, G., D. E. Petty, V. Turnbull, M. T. Edgerton, and R. F. Edlich. 1974. Identification of the Wound Infection Potentiating Factor in Soil. Amer. J. of Surgery 128:8-14.
- Rodeheaver, G. T., D. E. Petty, J. G. Thacker, M. T. Edgerton and R. F. Edlich. 1975. Wound Cleansing by High Pressure Irrigation. J. Surgery, Gynecology and Obstetrics 141:357-362.
- Reneau, R. B. and D. E. Petty. 1975. Movement of Coliform Bacteria from Septic Tank Effluent through Selected Coastal Plain Soils of Virginia. J. Env. Qual. : 4, No. 1:41-44.

- Reneau, R. B. and D. E. Pettry. 1975. Movement of Methylene Blue Active Substances from Septic Tank Effluent Through Two Coastal Plain Soils. *J. Env. Qual.* 4, No. 3:370-375.
- Reneau, R. B., J. H. Elder, D. E. Pettry, and C. W. Weston. 1975. Influence of Soils on Bacterial Contamination of a Watershed from Septic Sources. *J. Env. Qual.* 4, No. 2:249-252.
- Wilfong, R. T., D. E. Pettry, and J. H. Elder. Professional Field Day: A Stimulus to Undergraduate Programs in Plant Science Curricula. *J. Agron. Ed.*, Vol. 3:26-31. 1975.
- Reneau, R. B. and D. E. Pettry. 1976. Phosphorus Distribution from Septic Tank Effluent in Coastal Plain Soils. *J. Env. Qual.* 5, No. 1:34-39.
- Powell, N. L., D. M. Porter, and D. E. Pettry. 1976. Use of Aerial Photography to Detect Diseases in Peanut Fields I. Sclerotinia Blight. *J. Peanut Sci.* 3:21-24.
- Powell, N. L., G. J. Griffin, K. H. Garren, and D. E. Pettry. 1976. Use of Aerial Photography to Detect Diseases in Peanut Fields II. Cylindrocladium Black Rot. *J. Peanut Sci.* 3:25-29.
- Elder, J. H., Jr., and D. E. Pettry. 1976. Soils Survey of Madison County, Virginia. U.S. Dept. of Agriculture. Washington, D. C. 143 pp. & maps.
- Odenyo, V. A. O. and D. E. Pettry. 1977. Land Use Mapping of a Rapidly Changing Agricultural/Urban Area by Machine Processing of LANDSAT-1 MSS DATA: City of Virginia Beach, Virginia. *J. Photogrammetric Engineering* 43:515-523.
- Reneau, R. B., D. E. Pettry, M. I. Shanholtz, S. A. Graham, and C. W. Weston. 1977. Distribution of Total and Fecal Coliform Organisms from Septic Effluent in Selected Coastal Plain Soils. *J. Public Health Reports* 92:251-259.
- Bliley, D. J. and D. E. Pettry. 1979. Carolina Bays on the Eastern Shore of Virginia. *Soil Sci. Soc. Amer. J.* 43:558-564.
- Pettry, D. E., J. H. Scott, Jr. and D. E. Bliley. 1979. Distribution and Nature of Carolina Bays on the Eastern Shore of Virginia. *Va. J. of Sci.* Vol. 29, No. 4 In Press.

Research Division Publications

- Pettry, D. E., D. L. Kaster, H. C. Porter, and S. S. Obenshain. 1970. Morphological Descriptions and Chemical Properties of Selected Prince William County, Virginia, Soils. Research Division Report 143, Virginia Polytechnic Institute and State Univ., 88 pp.
- Pettry, D. E. 1972. Status of Virginia Soil Surveys. Research Division Report 42, Virginia Polytechnic Institute and State Univ.
- Pettry, D. E., M. E. Newhouse, E. M. Dunton, Jr., and J. H. Scott. 1972. Remote Sensing in Virginia Agriculture. Research Div. Report 71, Virginia Polytechnic Institute and State Univ., 7 pp.

Pettry, D. E. 1972. Use of Agriculture Lands. The Ecology of Land. Research Monograph 5, Virginia Polytechnic Institute and State University. pp 17-24.

Pettry, D. E. 1973. Soil Survey Field Sheets of Montgomery County, Virginia, Research Division Virginia Polytechnic Institute and State Univ., 109 p.

Pettry, D. E., J. H. Elder, and J. R. Grove. 1974. Chemical Properties of Selected Madison County, Virginia, Soils. Research Division Report Virginia Polytechnic Institute and State Univ., 28 p.

Pettry, D. E. 1975. Selected Soils of Orange County, Virginia, Their Chemical Properties. Research Division Report 165, Virginia Polytechnic Institute and State Univ., 26 p.

Pettry, D. E. 1977. Status of Mississippi Soil Surveys, MAFES Info. Sheet 1276:4p.

Pettry, D. E. 1977. Soil Resource Areas of Mississippi. MAFES Info. Sheet 1278:4p.

Pettry, D. E. and W. M. Koos. 1977. Ten Year Soil Survey Program Plan for Mississippi. MAFES Cooperative publication with USDA:4p.

Extension Division Publications

Mathews, H. L., H. C. Porter, D. E. Pettry, and C. J. Koch. 1970. Soils of Chesterfield County, Virginia. Extension Division Report No. 13, Virginia Polytechnic Institute and State Univ., 320 pp.

Isgrig, D., C. J. Koch, H. C. Porter, and D. E. Pettry. 1970. Soils of King George County, Virginia. Extension Division Report No. 12, Virginia Polytechnic Institute and State Univ., 130 pp.

Pettry, D. E. 1970. Understanding Soils. Proc. 10th Virginia Turfgrass Conference. Extension Division Publication MA119, Virginia Polytechnic Institute and State Univ., pp 4-8.

Van Dine, J. W., G. R. Epperson, L. T. Richardson, and D. E. Pettry. 1971. Soils of Charlotte County, Virginia. Extension Report 13, Virginia Polytechnic Institute and State Univ., 201 pp.

Porter, H. C. and D. E. Pettry. 1971. Can You Afford Not to Look At Soils? Extension Division Report 449, Virginia Polytechnic Institute and State Univ., 375 pp.

Hockman, J., J. McKinney, H. C. Porter, and D. E. Pettry. 1972. Soils of Augusta County, Virginia. Extension Report 14, Virginia Polytechnic Institute and State Univ., 298 pp.

Hodges, R. L. and D. E. Pettry. 1976. Soils of Hanover County, Virginia. Extension Report 17, Virginia Polytechnic Institute and State Univ., 363 p.

Elder, J. H., Jr. and D. E. Pettry. 1976. Soils of Spotsylvania County, Virginia. Extension Report 18, Virginia Polytechnic Institute and State Univ., 164 p.

Baskin, C., D. E. Pettry and K. Anderson. Land Selection and Preparation - Corn Production. 1977. Miss. State U. Cooperative Extension Service Info. Sheet 890:2p.

Anderson, K. and D. Pettry. 1978. Soils of the Mississippi Delta. Mississippi State U. Cooperative Extension Service Info. Sheet 966:2p.

Anderson, K. and D. E. Pettry. 1978. Soils of the Interior Flatwoods. Miss. State U. Cooperative Extension Service Info. Sheet 969:2p.

Anderson, K. and D. E. Pettry. 1978. Soils of the Blackland Prairies. Miss. State U. Cooperative Extension Service Info. Sheet 911:2p.

Book Reviews:

Pettry, D. E. and V. Nash, 1976. Proceedings of the International Clay Conference 1975. S. W. Bailey (ed.). J. Soil Science 122:308.

Published Abstracts and Papers Presented at Professional Meetings

Pettry, D. E. and C. I. Rich. 1969. Modifications of Certain Soils by Calcium Hydroxide Stabilization. American Soc. of Agronomy Abstracts, Detroit, Michigan, p. 170.

Elder, J. H. and D. E. Pettry. 1969. Morphology of Soils Developed in Unconsolidated Sediments in Western Spotsylvania County, VA. American Soc. of Agronomy Abstracts, Detroit, Michigan, p. 106.

Edler, J. H. and D. E. Pettry. 1969. Field Observations of Soils Developed in Unconsolidated Sediments in Western Spotsylvania County, Virginia. Virginia Journal of Science 20:97.

Richardson, G., D. E. Pettry, C. I. Rich, R. L. Hodges, and S. S. Obenshain. 1969. Chemical, Physical, and Mineralogical Characteristics of the Cecil and Appling Series. Virginia Journal of Science 20:100.

Pettry, D. E. and W. J. Meyer. 1970. The Soil Survey and Interpretation Program in Virginia. Virginia Journal of Science 21:136.

Pettry, D. E. and J. H. Elder. 1970. Plinthite - A new Genetic Horizon for Coastal Plain Soils in Virginia. Virginia Journal of Science 21:136.

Edmonds, W. J. and D. E. Pettry. 1970. Influences of Inherited Mineralogy from Ordovician Limestones on Two Typic Hapludalfs in the Shenandoah Valley of Virginia. Amer. Soc. of Agron. Abstracts, Tucson, Arizona, p. 170.

Pettry, D. E. and M. E. Newhouse. 1972. Remote Sensing in Virginia Agriculture, Virginia Journal of Science 23:101.

Newhouse, M. E. and D. E. Pettry. 1972. Improvements in Aerial Photographic Techniques Relative to the Identification of Plant Species, Nutrient Deficiencies, and Certain Soil Characteristics. Amer. Soc. of Agron. Abstracts, Miami, Florida, p. 48.

- Reneau, R. B. and D. E. Pettry. 1972. The Movement of Septic Tank Effluent in Selected Coastal Plain Soils of Virginia. *Virginia Journal of Science* 23:102.
- Newhouse, M. E. and D. E. Pettry. 1972. Multispectral Interpretation via Remote Sensing of Soils and Crops in Selected Coastal Plain Soils of Virginia. *Virginia Journal of Science* 23:101.
- Bliley, D. J. and D. E. Pettry. 1974. Soils and Morphology of Carolina Bays on the Eastern Shore of Virginia. *Amer. Soc. of Agronomy Abstracts*, Chicago, Illinois.
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Pettry, D. E. 1973. Carolina Bays in Virginia. National Aeronautics Space Administration NEWS, July, 1973. International Circulation.

Pettry, D. E., N. L. Powell, and M. E. Newhouse. 1974. Use of Remote Sensing in Agriculture. National Aeronautics and Space Administration Report NASA CR-62098, Wallops Flight Center, 139 pp.

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CHARLES L. WAX

Assistant Professor of Geography

PERSONAL: [REDACTED]EDUCATION:

- A.A. - Mississippi Delta Junior College, 1967
- B.A. - Delta State University, 1969
- M.S. - Louisiana State University, 1974
- Ph.D. - Louisiana State University, 1977

EXPERIENCE:

- 1969 Graduate Teaching Assistant, Delta State University
- 1973-75 Graduate Teaching Assistant, Louisiana State University
- 1973 Research Associate, Coastal Studies Institute, Louisiana State University
- 1975-77 Research Assistant, Center for Wetland Resources, Louisiana State University
- 1977 Associate Scientist, Coastal Environments, Inc., Louisiana
- 1978-Present Assistant Professor, Mississippi State University - Teaching Responsibilities Include: GR 1013, Introduction to Geography; GR 1023, World Regional Geography, and GR 3203, Geography of North America. Graduate Student Involvement Includes: Major professor and thesis advisor for one graduate student.

PROFESSIONAL AND/OR HONORARY MEMBERSHIPS:

- Advisor, 5 undergraduate majors
- Consultant, U.S. Department of Energy (2 projects), 1977
- Consultant, U.S. Environmental Protection Agency, 1977
- Consultant, Louisiana Office of Highways, 1977
- Consultant, U.S. Army Corps of Engineers (2 projects), 1977
- Regional Science Fair Judge, Mississippi State University, 1978

PUBLICATIONS AND PAPERS PRESENTED SINCE 1975:

1. Synoptic Climatology of Lake Charles, Louisiana, 1971-74; Paper presented at Meeting of Southwest Social Science Association; published in Abstract by Southwest Social Science Association, 1976.
2. Climate and Hydrologic Response in the Chenier Plain of Texas and Louisiana: Chenier Plain Atlas, Center for Wetland Resources, Louisiana State University, 1977.
3. Vermilion Basin: Synoptic Weather Types and Environmental Responses: Coastal Zone Management Series, Center for Wetland Resources, Louisiana State University, 1977.
4. Environmental Planning: The Fourth Dimension in Geothermal Resource Development: Paper presented at Third Geopressured-Geothermal Energy Conference; published in Proceedings of Third Geopressured-Geothermal Energy Conference, 1977. (with E. Emmer)
5. Barataria Basin: Synoptic Weather Types and Environmental Responses: Coastal Zone Management Series, Sea Grant Publ. No. LSU-T-78-001, Center for Wetland Resources, Louisiana State University, 1978. (with M.S. Borengasser and R.A. Muller)
6. Relationships Between Climate and Daily Water Level Fluctuations in a Coastal Stream: Paper presented at National Meeting of Association of American Geographers; published in Abstract by Association of American Geographers, 1978.
7. Comparative Climatic Baseline for Coastal Louisiana: Published in Geoscience and Man, School of Geoscience, Louisiana State University, 1978. (with R.A. Muller)

1. Name: Harry A. Jacobson
2. Department: Wildlife and Fisheries
3. Age: 36
4. Academic rank: Associate Professor
5. Degrees with field, institution and date:
 - 1967 - B.S., Wildlife and Fisheries Biology, Michigan State University.
 - 1973 - M.S., Wildlife Management, Virginia Polytechnic Institute and State University.
 - 1976 - Ph. D., Fisheries and Wildlife, Virginia Polytechnic Institute and State University.
6. Experience:
 - 1961-1962 - Grocery store carry-out boy and stock boy, National Foods, Davison, Michigan.
 - 1962-1963 - Student custodian, Wilson Hall, Michigan State University.
 - 1963 - Summer. Mill worker, Frazor Lumber Company, Davison, Michigan.
 - 1963 - Summer. Loading dock worker, A.C. Spark Plug, Flint, Michigan.
 - 1964-1965 - Assembly line worker, Fisher Body, Flint, Michigan.
 - 1965 - Summer. Mason Tender, John Steinbock Construction Company, Flint Michigan.
 - 1965-1966 - Student Custodial Supervisor, Wonders Hall, Michigan State University.
 - 1966 - Summer. National Park Ranger, Isle Royale National Park.
 - 1966-1967 - Student Custodial Supervisor, Wonders Hall, Michigan State University.
 - 1967-1971 - Captain, United States Air Force
 - 1972-1976 - Graduate Research Assistant, Department of Fisheries and Wildlife Science, Virginia Polytechnic Institute and State University.
 - 1976-1979 - Assistant Professor, Department of Wildlife and Fisheries, Mississippi State University.
 - 1979-Present- Associate Professor, Department of Wildlife and Fisheries, Mississippi State University.
7. Scientific, professional, honor societies, and honors received:

Certified Wildlife Biologist	Xi Sigma Pi
The Wildlife Society	Phi Sigma
The American Society of Mammalogists	Sigma XI
The Wildlife Disease Association	Gamma Sigma Delta

The Urban Affairs and Regional Planning Committee, The Wildlife Society (1972-1973).

President, V.P.I. and S.U. Student Chapter of The Wildlife Society (1972-1973).

Exotic Wildlife Committee, S.E. Section of The Wildlife Society (1978-Present).

Advisor, Student Chapter, of The Wildlife Society, Mississippi State University (1976-Present).

Member of Graduate Faculty, Mississippi State University.

Elected to Faculty of Interdisciplinary Curriculum in Animal Physiology, Mississippi State University, 1978.

Chairman, Wildlife Management Award Committee, S.E. Section of The Wildlife Society (1979-Present).

President Elect, Mississippi Chapter The Wildlife Society 1980

Military Honors: Bronze Star Medal; Air Force Commendation Medal; National Defense Medal; Viet Nam Campaign Medal; Viet Nam Service Medal; 1970 nomination for outstanding junior officer of the Pacific Air Force.

Professional Honors: Received McCormic Scholarship, 1972; A.B. Massey Honorarium, 1973, Division of Forestry and Wildlife's outstanding graduate student award, Virginia Polytechnic Institute and State University; Certificate of Merit for research contributions, 1976, Virginia Commission of Game and Inland Fisheries; Student Curriculum Clubs Outstanding Professor, Department of Wildlife and Fisheries, 1980, Mississippi State University; Co-author best S.E. Wildlife Conference Paper, 1980.

8. Teaching Responsibilities:

<u>Course No.</u>	<u>Title</u>
WL 4533/6533	Parasites of Game and Fish
WL 5143/7143	Wildlife Management Techniques II
WL 8101/8111	Graduate Seminar in Fisheries and Wildlife
WL 5111	Undergraduate Seminar in Fisheries and Wildlife

9. Areas of research interest:

Wildlife physiology and disease.

10. Publications:

Seventy (75); includes 17 papers in reviewed journals, one reviewed monograph; 12 popular articles, 37 presentations at scientific meetings (abstracts published) and 6 other technical papers.

11. Extramural Research Grants Awarded 1976-1980:

Modeling Herd Characteristics on State Game Management areas in Mississippi.

D. Gynn and H. Jacobson, Fed. Aid \$166,339.

Establishment of a Data Base for Statewide Application of the Population Reconstruction Model.

H. Jacobson and D. Gynn, Fed. Aid \$177,687.

Survey of Mississippi Hunters to Determine Hunter Characteristics and Opinions.

D. Gynn and H. Jacobson, Fed. Aid \$45,978.

Establishing Reliable Aging Techniques for White-Tailed Deer in Mississippi.

D. Gynn and H. Jacobson, Fed. Aid \$75,246.

Data Analysis and Final Report Preparation, Studies of the White-tailed Deer in Mississippi.

H. Jacobson, Fed. Aid \$44,240.

Botfly (Cuterebra emascuator) Parasitism of the Gray Squirrel in Mississippi.

H. Jacobson and D. Gynn, Fed. Aid \$40,279.

Cattle and Deer Relationships in the Southeastern Pine Forest.

H. Jacobson, U.S. For. Serv., MS \$77,480.

Diet Analysis of Cattle and White-tailed Deer in Southeastern United States.

M. Johnson and H. Jacobson, U.S. For. Serv. S. Exp. Stat., \$20,481.

Comparison of Tame Deer and Wild Deer Food Habits.

H. Jacobson, U.S. For. Serv. S. Exp. Stat. \$12,171.

Food Habit Analysis of Fox and Gray Squirrels Collected from Mississippi Forest Habitat.

H. Jacobson and Marion Gray. U.S. Fish and Wildlife Service, \$8,097.

Movements and Habitat Utilizations of White-tailed Deer in Bottomland Habitat in Mississippi.

H. Jacobson, Fed. Aid \$12,430.

Effects of Delayed Breeding on Subsequent Reproductive Performances of Female White-tailed Deer and their Offspring.

H. Jacobson, Fed. Aid \$13,842

Survival, Natality and Exploitation of the Red Fox in Mississippi.

H. Jacobson, Fed. Aid \$114,129.

Publications and Papers of Harry A. Jacobson, Department of Wildlife and Fisheries, Mississippi State University, Mississippi State, MS 39762:

- *Jacobson, H. A., and R. L. Kirkpatrick: 1973. The use of insecticide generating collars for the investigation of parasitic disease in wildlife populations. Proc. 27th Conf. S.E. Assoc. Game and Fish Comm. 27:344-345.
- **Jacobson, H. A., and R. L. Kirkpatrick: 1973. Influence of insecticide generating collars and antihelminth drug treatment on parasites of cottontail rabbits. Va. J. Sci. 24:124 (Abstract).
- Jacobson, H. A. 1973. Pathological and Physiological Relationships of Parasitic Disease in a Select Cottontail Rabbit Population. M.S. Thesis, Virginia Polytechnic Institute and State University, Blacksburg. 96pp.
- ***Jacobson, H. A. 1974. Of grizzly bears and mink. Va. Wildl. 35(2): 5, 20.
- *Jacobson, H. A., R. L. Kirkpatrick, and R. B. Holliman. 1974. Emaciation and enteritis of cottontail rabbits infected with Hasstilesia tricolor and observation on a fluke to fluke attachment phenomenon. J. Wildl. Dis. 10:111-114.
- *Jacobson, H. A., and R. L. Kirkpatrick. 1974. Effects of parasitism on selected physiological measurements of the cottontail rabbit. J. Wildl. Dis. 10:384-391.
- ***Jacobson, H. A. 1975. Six legged wolves of Virginia. Va. Wild. 36(5):22.
- **Jacobson, H. A., and B. S. McGinnes. 1975. Botfly (Cuterebra buccata) parasitism of the cottontail rabbit in Virginia. Va. J. Sci. 26:56 (Abstract).
- **Jacobson, H. A., R. L. Kirkpatrick, and B. S. McGinnes. 1975. Tularemia: Its possible role in regulation of cottontail rabbit populations in Virginia. Va. J. Sci. 26:56 (Abstract).
- ***Jacobson, H. A. 1975. Where have all the rabbits gone? Va. Wildl. 36(8):9.
- ***Jacobson, H. A. 1975. Where have all the rabbits gone? Hounds and Hunting 72(11):16, 18, 20. (Reprinted from Va. Wildl. 36(8):9).
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- **Jacobson, H. A. 1975. Metazoan parasites of cottontail rabbits from two Virginia locations. Unpublished paper presented at the Annual Wildlife Disease Conference, Guelph, Ontario, Canada, 23 August 1975.
- *Nettles, V. F., W. R. Davidson, S. K. Fisk, and H. A. Jacobson. 1975. An epizootic of cerebrospinal nematodiasis in cottontail rabbits. J.A.V.M.A. 167(7):600-602.

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- **Jacobson, H. A., and R. L. Kirkpatrick. 1976. Serum corticoids and hematology of cottontail rabbits as affected by capture method. *Va. J. Sci.* 27(2):45 (Abstract).
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- **Jacobson, H. A. and R. L. Kirkpatrick. 1976. Condition indices of cottontail rabbits (*Sylvilagus floridanus*) as affected by season, sex and age. Abstracts of papers presented at the American Society of Mammalogists meeting, Lubbock, Texas. 20-24 June 1976. 56:41.
- ***Cross, G. H., and H. A. Jacobson. 1976. A survey of beagle clubs and rabbit management. *Hounds and Hunting.* 73(9):50-53.
- ***Jacobson, H. A. 1976. Pulling together. *Mississippi Game and Fish.* 39(11):16-17.
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- ***Hetrick, M. S., and H. A. Jacobson. 1977. Wanted dead or alive. *Mississippi Game and Fish.* 49(5):17.
- *Guynn, D. C., H. A. Jacobson, E. J. Hackett, and E. Cliburn. 1977. A self-service system for estimating hunter usage and harvest on management areas in Mississippi. *Proc. Thirty-first Conf. S. E. Assoc. Game and Fish. Comm.* 31:147-150.
- **Guynn, D. C., H. A. Jacobson, and W. A. Mitchell. 1977. Deer data collection systems used by state wildlife management agencies. 1977 *Proc. Northeast-Southeast Sec. Deer Study Group Meeting.* 5-8 Sept. 1977. Blackstone, Va. 1:41-46.
- **Jacobson, H. A., D. C. Guynn, L. F. Castle, and E. J. Hackett. 1977. Relationships between soil characteristics and body weights, antler measurements and reproduction of white-tailed deer in Mississippi. *Proc. Northeast-Southeast Sec. Deer Study Group Meeting.* 5-8 Sept. 1977. Blackstone, Va. 1:47-55.
- *Jacobson, H. A., R. L. Kirkpatrick, H. W. Burkhart, and J. W. Davis. 1978. Hematologic comparisons of shot and live trapped cottontail rabbits. *J. Wildl. Dis.* 14(1):163-172.

- *Jacobson, H. A., R. L. Kirkpatrick, and B. S. McGinnes. 1978. Disease and Physiologic Characteristics of Two Cottontail Populations in Virginia. Wildlife Monograph. 60:53pp.
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- **Thomason, W. B., and H. A. Jacobson. 1978. Reproduction of beaver (Castor canadensis) in East-central Mississippi. Abstracts of papers presented at the American Society of Mammalogists meeting. Athens, Georgia, June 20-24, 1978. 58:
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- **Owen, S. P., H. A. Jacobson, and D. C. Gynn. 1978. Seasonal and area differences in blood chemistry of female white-tailed deer in Mississippi. Abstracts of papers presented at the 1978 Annual Wildl. Dis. Assoc. Conference, Fort Collins, Colorado, February 2-5, 1978.
- **Demarais, S., H. A. Jacobson, D. C. Gynn, and L. C. Malone. 1978. Abomasal parasite counts of selected white-tailed deer populations in Mississippi. Abstracts of papers presented at the 1978 Annual Wildl. Dis. Assoc. Conference, Fort Collins, Colorado, February 2-5, 1978.
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- **Castle, L. E., H. A. Jacobson, and D. C. Gynn. 1978. Hair diameter and sulfur content as condition indices of the white-tailed deer. Abstracts of papers presented at the 1978 Annual Wildl. Dis. Assoc. Conference, Fort Collins, Colorado, February 2-5, 1978.
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- ***Gynn, D. C., H. A. Jacobson, and T. M. Lowe. 1978. Too many or not enough? Mississippi Game and Fish Magazine. 41(5):6-7.
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- Guynn, D. C., C. F. Mason, H. A. Jacobson, and D. H. Arner. 1978. Mississippi Mail Survey of Trapping Harvest for 1976-77. Mississippi Game and Fish Commission, Jackson, Mississippi. 22pp. Study Completion Report, Federal Aid Project No. W-48-25.
- *Jacobson, H. A., and G. A. Hurst. 1979. Prevalence of parasitism by Amblyomma americanum on wild turkey poults as influenced by prescribed burning. J. Wildl. Dis. 15(1):43-47.
- *Jacobson, H. A., D. C. Guynn, and E. J. Hackett. 1979. Impact of the Botfly on Squirrel Harvests in Mississippi. Wildl. Soc. Bull. 7(1):46-48.
- **Jacobson, H. A. 1978. Cattle and deer diet in longleaf slash pine habitat. Invitational paper given Southern Section Society for Range Management, December 7-8, Montgomery, Alabama.
- ***Jacobson, H. A. 1978. The squirrel botfly problem. The Outdoor Watchdog. 6(11):13.
- **Hackett, E. J., D. C. Guynn, and H. A. Jacobson. 1979. Age structure difference produced by annuli aging and wear and replacement aging. Abstracts of Technical Papers presented at the second annual meeting of the Southeast Deer Study Group. Mississippi Game & Fish Comm. Jackson, Miss.
- **Demarais, S., H. A. Jacobson, D. C. Guynn, and L. C. Malone. 1979. Affects of season, age, sex and area on abomasal parasite counts of white-tailed deer in Mississippi. Abstracts of Technical Papers presented at the second annual meeting of the Southeast Deer Study Group. Mississippi Game and Fish Commission, Jackson, Miss.
- **Mitchell, W. A., H. A. Jacobson, and M. Gray. 1979. Preliminary results on cattle and deer relationships in the southeastern pine forests. Abstracts of Technical Papers presented at the second annual meeting of the Southeast Deer Study Group. Mississippi Game and Fish Commission, Jackson, Miss.
- Jacobson, H. A., D. C. Guynn, and E. Cliburn. 1979. A bibliography of the white-tailed deer. Mississippi Game and Fish Commission. 216pp.
- **Jacobson, H. A., M. W. Smith, R. F. Mathews, T. C. Randolph, and J. Sullivan. 1979. Hematology of the Black Vulture. Abstracts of 1979 Wildlife Disease Association Conference. University of Oklahoma, Norman, OK. August 6-9, 1979.

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- *Hackett, E. J., D. C. Guynn, and H. A. Jacobson. 1979. Differences in age structure and white-tailed deer in Mississippi produced by two aging techniques. Proc. 33rd Ann. Conf. S. E. Assoc. of Fish and Wildl. Agencies. 33:25-29.
- *Jacobson, H. A., D. C. Guynn, R. N. Griffin, and D. L. Lewis. 1979. Fecundity of white-tailed deer in Mississippi and periodicity of corpora lutea and lactation. Proc. 33rd Ann. Conf. S. E. Assoc. of Fish and Wildl. Agencies. 33:30-35.
- **Bearden, J., B. Griffin, and H. A. Jacobson. 1980. Ejaculation and semen collection from white-tailed deer with an artificial vagina. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:9.
- **Gruver, B. J., D. C. Guynn, H. A. Jacobson, and R. N. Griffin. 1980. Possible effects of harvest strategy on the reproductive biology of white-tailed deer in Mississippi. S. E. Deer Study Group meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:11-12.
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- **Mitchell, W., and H. A. Jacobson. 1980. Differential digestibility of major forages in the southeastern pine forest. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13. 3:4-5.
- **Whiteside, R. W., D. C. Guynn, Jr., and H. A. Jacobson. 1980. Expenditures and attitudes toward a self-service permit system of deer hunters in Mississippi. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:13-14.
- **Yarrow, G. D., and H. A. Jacobson. 1980. Evaluation of the lead deer techniques as a method of determining food habits of wild deer. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:8-9.
- **Richardson, L. W., W. A. Mitchell, H. A. Jacobson, and C. J. Perkins. 1980. Behavior of captive white-tailed deer does and their fawns. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:24-25.
- **Waldhalm, S., H. A. Jacobson, and R. N. Griffin. 1980. Seasonal patterns of male white-tailed deer reproductive organs: a study of gross and histologic morphology. S. E. Deer Study Group Meeting, Nacogdoches, TX. Feb. 11-13, 1980. 3:26-27.
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- **Demarais, S., L. C. Malone and H. A. Jacobson. 1980. Comparison of three statistical techniques for analysis of abomasal parasite count data. Abstracts of 1980 Wildlife Disease Conference, August 19-22. Baton Rouge, LA.
- **Jacobson, H. A. and B. C. Ward. 1980. Polioencephalomalacia in captive white-tailed deer. Abstracts of 1980 Wildlife Disease Conference, August 19-22, Baton Rouge, LA.
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- *Jacobson, H. A., M. S. Hetrick, and D. C. Guynn. 1981. Prevalence of Cuterebra emascuator in squirrels in Mississippi. J. Wildl. Dis. 17(In Press).
- **Guynn, D. C., S. P. Mott, H. A. Jacobson. 1981. Regulations of deer harvest on private lands in east-central Mississippi. S.E. Deer Study Group Meeting, Panama City, Fla. Feb. 16-18, 1981 4:3.
- **Hackett, E. J., H. A. Jacobson and D. C. Guynn. 1981. The deer club association: an efficient and manageable unit. S.E. Deer Study Group Meeting, Panama City, Fla. Feb. 16-18, 1981 4:4-5.
- **Jacobson, H. A., D. C. Guynn and E. J. Hackett. 1981. Soil phosphorus as a site index for deer management. S.E. Deer Study Group Meeting, Panama City, Fla. Feb 16-18, 1981. 4:10-11.
- **Jacobson, H. A. and R. H. Griffin. 1981. Male reproductive cycle of the white-tailed deer in Mississippi. S.E. Deer Study Group Meeting, Panama City, Fla. Feb. 16-18, 1981. 4:17.
- *Whiteside, R. W., D. C. Guynn, and H. A. Jacobson. 1981. Hunter use and economic characteristics of deer hunting on two areas in Mississippi. Wildl. Soc. Bull. 9(In Press).

*Indicates a reviewed journal or monograph.

**Indicates a paper presented at a scientific meeting.

***Indicates an article published in a popular magazine.

RESUME

106

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EDUCATION: Mississippi State University, 1972-77. Bachelor of Science in Forestry. Degree concentration focused on forest and wildlife management. Major coursework included: Silviculture, forest economics and management, soils, pathology, remote sensing applications, wildlife conservation and technology.

Delta State University, 1971-72 and fall of 1976. No degree. Coursework included: Biology, geology philosophy, sociology, psychology. Planned and taught 7th grade science in experimental situation involving small and large group instruction and 'hands on' laboratory instruction.

CAREER RELATED WORK EXPERIENCE: Mississippi Remote Sensing Center (MRSC), Mississippi State University, 1980 to present. Research Assistant. Work involves research and development of base line maps for displaying environmental features of regional waterway system. Vegetative studies; i.e., wetlands and physiographic regions of the state. Digital satellite data interpretation. Use and knowledge of conventional remote sensing interpretation equipment. Technical writing.

ACTION/Smithsonian Peace Corps., Ecuador, S.A., 1977-79. Forest Engineer. Worked in conjunction with development agency researching alternative exotic and native tree species for reforestation of southern Sierra of Ecuador. Nursery experience. Biannual technical reports to government. Training of forest technicians. Community forest extension. Fluent Spanish speaking and writing ability.

OTHER SKILLS: Carpentry, masonry, welding, farming

EXTRA CURRICULAR: Member of Xi Sigma Phi; Alpha Theta Chapter
Member of National Geographic Society
Member of American Society of Photogrammetry
Dean's List, Mississippi State University
Delta State University
President's List, Mississippi State University
Interests: Music, travel, sports, reading, hunting

PERSONAL DATA: [REDACTED] Height: 6'1"
Health: Excellent [REDACTED] Weight: 160 lbs.

